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HISTORY

OF

FOSSILS.

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Guſtava Eleonora Lindahl född Gjörwell

A

HISTORY

OF

FOSSILS.

By JOHN HILL.

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A GENERAL

NATURAL HISTORY:

OR,

NEW and ACCURATE

DESCRIPTIONS

OF THE

Animals, Vegetables, and Minerals,

Of the DIFFERENT

PARTS of the WORLD;

WITH

Their VIRTUES and USES, as far as hitherto certainly known, in MEDICINE and MECHANICS:

ILLUSTRATED

By a GENERAL REVIEW of the Knowledge of the Ancients, and the Diſcoveries and Improvements of later Ages in theſe Studies.

INCLUDING

The HISTORY of the *MATERIA MEDICA, PICTORIA,* and *TINCTORIA,* of the Preſent and Earlier AGES.

AS ALSO

OBSERVATIONS on the neglected Properties of many valuable Subſtances known at preſent; and Attempts to diſcover the loſt Medicines, *&c.* of former Ages, in a Series of Critical Enquiries into the *MATERIA MEDICA* of the Ancient GREEKS.

WITH

A great Number of FIGURES, elegantly engraved.

By JOHN HILL.

LONDON:
Printed for THOMAS OSBORNE, in Gray's-Inn, Holbourn.

M.DCC.XLVIII.

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VOL. I. The Hiſtory of FOSSILS.

VOL. II. The Hiſtory of PLANTS.

VOL. III. The Hiſtory of ANIMALS.

Each being in itſelf a compleat Hiſtory of one of the Three great Claſſes of Natural Bodies.

DEDICATION.

TO

Doctor *SHAW*.

SIR,

AS I am proud of acknowledging that it was principally owing to your favourable opinion, that I have had the courage to attempt this Hiſtory, I am left without the choice of who ſhould be its Patron now it is to make its appearance in the world; but I cannot but account myſelf very happy even in this circumſtance, ſince gratitude demands of me the very name, which juſtice would otherwiſe have claim'd to be prefix'd to it.

I am ſenſible that I ſhall be accus'd of arrogance, in dedicating a work of this difficult kind, to the greateſt judge of the ſubject it treats of, that the preſent or perhaps any age has produc'd; far be it from me to entertain too high an opinion of my own attempts, but I have always taught myſelf to think that That work which is unworthy the peruſal of the moſt judicious, can be by no means proper for that of others, who are to form their judgment of things from it.

A My

DEDICATION.

My own private wiſhes will be indeed abundantly ſatisfy'd, in your honouring an addreſs of this kind with your acceptance, ſince while I have your good opinion, I ſhall have nothing to fear from cenſure; but the advantage is not all mine; the world has alſo its ſhare in it, ſince yours is a name, under the ſanction of which there can be no fear of any thing being offered to it that will prove unworthy its regard.

Of what nature the acknowledgements are which the publick owe to your candour, for the early notice you were pleas'd to take of this attempt, the reception it meets with in the world can alone determine; but whatever that may be, it was to me a generous kindneſs, which can never ſuffer me to forget with how high a ſenſe of gratitude and eſteem

I am,

SIR,

Your Moſt Obedient

And Moſt Humble Servant,

JOHN HILL.

THE
PREFACE.

WHILE the value and uſes of many of the bodies, which are the ſubjects of this hiſtory, cannot but have been known in almoſt all ages of the world; it ſeems ſtrange, that the regular ſtudy of the whole of them ſhould have been leſs cultivated in moſt than that of many other perhaps leſs worthy objects; and 'tis much to be lamented, that it ſhould have had ſo ſmall a ſhare of the advantages and improvements that the labours of the learned world have of late beſtow'd on all the other branches of knowledge, and in particular on Natural Hiſtory.

Notwithſtanding the many books that have been written on Foſſils, it cannot but have too clearly appeared to all who have engag'd in the ſtudy of them, that ſomething was ſtill greatly wanting toward attaining a true knowledge of them; and perhaps no work in Natural Knowledge could be at preſent ſo deſirable as a Hiſtory of Foſſils, engaged in with the neceſſary aſſiſtances, and attempted on a rational plan.

The firſt ſtep toward a deſign of this kind, was neceſſarily to examine what had been already publiſh'd on the ſubject, and many valuable truths, many excellent hints, and much real knowledge found in the works of Geoffroy, Mercatus, Steno, Boerhaave, Woodward, Morton, Plot, and the great Linnæus among the later writers; and of Agricola, Cæſalpinus, and Aldrovand among thoſe of a little earlier date, were to be eternally recorded, and made the baſis of after diſcoveries.

But tho' theſe valuable truths are to be ſelected from their works, there requires great care and attention, and the regular ſtudy of the bodies treated of, to ſeparate them from a much larger ſtore of leſs judicious matter: Since ſo great has been the diſregard paid to this ſtudy, that if we take the works of the ſeveral Authors on it together, we find them miſerably ignorant of the true nature of the bodies they treat of, and uſually taking upon truſt from one another accounts, which when trac'd up to their original, will often be found to have ſprung from error or credulity.

It

The PREFACE.

It is an unpleaſant obſervation, to find alſo the very greateſt of the Authors of late ages in Chymiſtry, Medicine, Optics, &c. in the midſt of the valuable truths and even ineſtimable diſcoveries they have left us on the ſubjects they have more profeſſedly written upon, falling into the moſt egregious errors in regard to the nature of the foſſile bodies which their diſcoveries are owing to; it would be an invidious taſk to bring together theſe erroneous accounts, and as their works are not needful to the proſecuting the ſtudy of Foſſils on the plan of this work it is unneceſſary, but by the notice occaſionally taken of them in the hiſtories of the ſubjects concerned, they will appear too plain, and the very greateſt of the late writers will be found not to have avoided them.

Theſe, however, are more the errors of ſuch as have written profeſſedly on Foſſils, than of thoſe in whoſe works they occaſionally appear; and while theſe will call things by falſe names, it is no wonder that the world follows them: Indeed the errors of this kind have not yet been in the way of detection, ſince the Criterions of the different Foſſils by which alone they could be brought to the teſt, have never yet been eſtabliſh'd; and while the Authors who profeſſedly write of theſe bodies, call Orpiment Talc, becauſe it is of a foliaceous ſtructure, and Spar, Cryſtal with a mixture of earth, becauſe it is pellucid, and often of a cryſtalline form; and while ſome call the Selenitæ Talc, becauſe they are foliaceous, and others Cryſtals, becauſe they are angular and tranſparent; and ſo of a thouſand other Inſtances, the judicious Reader, tho' he ſees that Orpiment is not Talc, and that Selenitæ are different both from Talc and Cryſtal, and that Spar muſt be ſomething elſe, and not Cryſtal, becauſe it is often as pellucid as Cryſtal itſelf, and therefore cannot owe its difference to earth mix'd in it; yet till there are characters invariable and diſtinctive known of each of theſe Claſſes of bodies, all muſt be ſtill confuſion.

After it is found how little aſſiſtance can be had from books in order to a true knowledge of Foſſils, recourſe is naturally to be had to the bodies themſelves. And here a ſtrict examination will make it appear, that true and diſtinctive characters are wanting in books only, not in nature; and that a variety of experiments on the ſubſtances themſelves, with the aſſiſtances of acid menſtruums, that ſtronger menſtruum fire, and the help of the Microſcope, will ſhew real and innate properties and qualities in theſe bodies, which are invariably found in all thoſe of the ſame claſs, and never in thoſe of any others; and which therefore give us true characters, by which we ſhall always be able to know the Foſſils of the ſame claſs as ſuch, and to diſtinguiſh them from all others.

Thus, though Orpiment and Talc are both of a foliaceous ſtructure; yet when we find that Orpiment is inflammable, and non-elaſtic, and that Talc is extreamly elaſtic, and is not inflammable; we find that *theſe are two abſolutely different Claſſes of Foſſils, and ſhall be always able to diſtinguiſh the ſeveral ſpecies of them from one another; even, though nature ſhould have form'd colourleſs Orpiments, as well as yellow Talcs: Colour is an accidental and variable quality, elaſticity and inflammability are innate and unalterable ones.*

Though Cryſtal and Spar are both in their purer ſtate angular and pellucid, yet when we find Cryſtal untouch'd by acid menſtrua, unalter'd in a moderate fire, and giving ſparks of fire on colliſion with ſteel; and Spar, on the contrary, effervesſcing with and ſoluble in acid menſtrua, readily calcining in a ſmall fire, and not giving ſparks with Steel. We ſhall aſſuredly know that theſe are bodies of different Claſſes, and be able to diſtinguiſh Spar from Cryſtal when-ever ſo pellucid; and Cryſtal when-ever ſo opake from Spar.

And though Selenitæ be pellucid and angular as Cryſtal, and foliaceous as Talc, yet when we find that they differ from Cryſtal in not giving fire with Steel, and from Talc in calcining readily in the fire, we ſhall be able to know all the ſpecies of Selenitæ from Talc and Cryſtal, and to find that they are a diſtinct Claſs of Foſſils, and different from either: And ſo of the reſt.

Since it is the bodies themſelves then which can alone give us a true knowledge of their nature; the great ſtep toward this attempt of giving their hiſtory, was the examining theſe ſeverally, and ſearching into their different properties and qualities as well as figures. This naturally led to the knowledge of their mutual alliances one with another, and they were eaſily, according to their ſeveral more general characters, arrang'd into the ſeveral Series *nature had ordain'd of them. The different ſubjects of theſe Series more minutely examin'd, were afterwards found to have their ſeveral ſecondary alliances in diſtinct ſets, which were owing to characters the ſame in all of the ſame ſet, and thoſe of each ſet wholly different from thoſe of all the others; and the dividing the ſeveral ſeries into theſe ſets gave the different* Claſſes *of Foſſils. Among theſe new divided ſets, there appear'd alſo on a farther view certain general and diſtinctive characters, ſeparating them into ſeveral* Orders, *as the more general characters, had before divided the whole Foſſile world into ſeries; and under theſe on the ultimate reſearch were found certain regular ſubdiſtinctions; and the arrangement of the whole order of bodies into their ſeveral alliances according to theſe, gave the laſt diſtinction of Foſſils into* Genera, *under which the farther differences were no more than thoſe of ſpecies from ſpecies.*

From a diſtribution of my own collection of Foſſils, rather numerous than elegant, according to theſe diviſions, there appear'd a method under which the whole ſtudy of Foſſils ſhew'd itſelf in the form of a regular ſcience; and a general table made from the characters of theſe, became a *ſcheme into which all the known Foſſils, were eaſily reducible, and which ſerv'd as the baſis of a rational hiſtory of them.*

It will be eaſily conceived that the Claſſes and Genera were in this diſtinct method much more numerous, than they had before appear'd in the writings of thoſe who had left ſeveral different Genera undiſtinguiſh'd from one another. And as every Genus muſt have its denotative expreſſion, that names muſt be wholly wanting for many of them; neither could there be in any language words ready form'd, expreſſive of ſuch combinations of characters in the different bodies of the ſame Genus, as were not known to exiſt before.

Hence the neceſſity of many new words; an undeſirable, though unavoidable taſk: Terms of art are ever hated when firſt heard, and ever deſpis'd till underſtood; it is an unhappy circumſtance alſo in regard to them, that the Greek a leſs univerſally known language, is ſo peculiarly expreſſive of much ſenſe in a few ſyllables, that it will claim the preference before all others for the formation of them. In the new words thus neceſſarily introduc'd here, the learned reader will not be diſpleas'd to find, that the words they are form'd of are in general thoſe which the antient Greek Naturaliſts have us'd in the fix'd and determinate ſenſe they are here made to ſtand in. And the generality of Readers will find reaſon to pardon the uſe of them, when they conſider that they ſave the almoſt endleſs repetition of whole ſentences, leſs than which could not, in the common way of ſpeaking, have expreſs'd the diſtinctive characters of every Genus which were neceſſary to be prefix'd to the ſub-diſtinctions in the name of every ſpecies of it. Thus, as there is a Genus of Cryſtal diſtinguiſh'd from the reſt by its being made up of a ſmaller number of planes than ſome other of the ſame Order, and compos'd of two pyramids join'd baſe to baſe without a column; in giving names to the ſeveral ſpecies of this Genus, the generical diſtinction to be firſt expreſs'd muſt, in the common way of expreſſion, take up many words, and muſt neceſſarily run thus, Cryſtal compos'd of two pyramids, without an intermediate column, and compos'd of but few planes; *and to this the diſtinction of each ſpecies is to be added: Is it not better to ſave the tedious repetition of all theſe words ſo often, by expreſſing the ſame ſenſe in one; and making the name of the Genus* Pauraedraſtylum, *which expreſſes a body compos'd of few ſides, and without a column; which, under the fix'd diſtinctions of the Series, Claſs and Order before given, expreſſes the whole generical character in one word: Words of this kind cannot but be of ſome length, but the meaning they convey pleads their pardon.*

Such is the general ſcheme and method of this attempt, and ſuch the reaſons for it. When the bodies by ſuch means became indiſputably known and diſtinguiſh'd, their uſes and their virtues were next to be enquir'd into.

The PREFACE.

Whatever may be the merit of the preſent chymical remedies ſo univerſally us'd in all diſeaſes, it is certain they have in a great meaſure ſet aſide the uſe of natural bodies. Theſe the later ages have therefore been little careful about; and the value of many of them leſs known now than perhaps at any other time of the world. The antients us'd them with great ſucceſs, as we find it eternally recorded in their writings; but we are told that thoſe who have try'd their ſo much boaſted remedies after them, have often found them fail: Hence unjuſt cenſures have fallen upon thoſe fathers of medicine, while he who accuſes them probably never knew the body they have celebrated the praiſes of, but has been giving for it, ſomething of a wholly different kind.

If Galen cur'd the plague with Bole Armenic, and we can find no ſuch virtues in it; let us ceaſe to blame Galen, and accuſe our own blindneſs, and the villainy of thoſe who ſerve us; the Bole Armenic deſcrib'd by Galen is a native earth, yielding on a chymical analyſis ſeveral active principles; the Bole Armenic of his accuſers is a miſerable mixture of tobacco-pipe clay and red ochre: And where ſhould the blame be laid, while the modern phyſician tries ſuch different means to the ſame purpoſe?

The antients, however, are not to be accus'd in this; they have ever deſcrib'd the bodies which they us'd, and given ſufficient characters to know them by; and in the inſtance under conſideration, the phyſician who had read Galen firſt, would never have given a red Compoſt under the name of what he deſcribes to be a yellow native earth.

The commentators on the works of theſe fathers of medicine and of natural knowledge, are much to be blam'd in that they have too boldly given their opinions as to the ſenſe of their works, and as they have been men no way acquainted with the things deſcrib'd, they have too often given ſad interpretations of very good original deſcriptions.

The bodies themſelves are the ſame to this day, that they were in the times of theſe writers; and their deſcriptions of them ſo good, that they are eaſily to be known: from viewing and comparing theſe therefore, their works are to be beſt underſtood; and the reader will not wonder, if he find here ſome free criticiſms, and bold deviations from the general opinion of ſuch commentators, when he finds that they are founded on ſuch principles.

From a certain knowledge thus obtain'd of the ſimple medicines us'd by the antients, we have the help of all their experience in the uſe of them, and may revive the moſt valuable parts of their knowledge in medicine; of this much is ſaid occaſionally in treating of the ſeveral bodies; but the whole enquiry belongs to the concluſion of the work, when we review the whole together.

The extraneous Foſſils; which are bodies of the animal or vegetable kingdoms accidentally bury'd in the earth, belong properly to the hiſtories of plants and animals; ſince the foſſile bodies which enter their compoſition are no way alter'd from the ſame Foſſils in their looſe ſtate; and the figures and characters of the extraneous remains, are much more properly to be enquir'd into when we come to deſcribe the bodies at large to which they belong. That nothing relating to the ſtudy of Foſſils may be omitted they are, however, enumerated in an appendix to this hiſtory, and their characters and diſtinctions, ſo far as is neceſſary in this their imperfect ſtate, aſſign'd. In theſe there is leſs immediate neceſſity of new words for names, yet to retrieve the honour of theſe ſtudies from the ſcandal of old errors, I have begg'd that ſharks teeth may be no longer call'd ſtony tongues; *the teeth of the wolf fiſh* Toadſtones; *nor the palates of fiſhes,* pods of vegetables; *but that if theſe things as Foſſils, muſt have their peculiar names, inſtead of* Gloſſopetræ, *the firſt may be call'd* Lamiodontes; *the ſecond, inſtead of* Bufonitæ, Lycodontes; *and the laſt, inſtead of* Siliquaſtra, Ichthyperia.

For the more readily diſtinguiſhing the native Foſſils, there is ſubjoin'd a general Table of the method alone, by which an unknown Foſſil may be trac'd from its more general alliances to its particular Genus, and on turning to the deſcriptions of the ſeveral ſpecies of that, it will not then remain long unknown.

DIRECTIONS for the BOOKBINDER.

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Table of FOSSILS.

General History. Part. Book. SERIES. CLASS. ORDER. GENUS. Name. Page

FOSSILS are

- 1. Naturally and eſſentially ſimple, and unmetallick.
  - 1. Not inflammable, nor ſoluble in water.
    - 1. Of no regular ſtructure, or determinate figure.
      - 1. Conſtituting ſtrata, or ſhapeleſs maſſes. SIMPLE EARTH.
        - 1. Of a ſmooth ſurface, and firmer texture.
          - 1. Moderately coherent, ſoft, ductile but not viſcid when moiſt, and readily diffuſible in water — Boli 2
          - 2. Firmly coherent, hard, very ductile and viſcid when moiſt, and not readily diffuſible in water — Argillæ 17
          - 3. Slightly coherent, not ductile or viſcid when moiſt, and moſt readily diffuſible in water — Margæ 36
        - 2. Of a rough, duſty ſurface, and a looſer texture.
          - 1. Slightly coherent, compos'd of ſoft particles, and readily diffuſible in water — Ochræ 51
          - 2. Firmly coherent, compos'd of hard particles, and not readily diffuſible in water — Tripelæ 66
    - 2. Of a regular ſtructure, but no determinate figure.
      - 1. Of a foliaceous or flaky ſtructure, flexile and elaſtick. TALC.
        - 1. Compos'd of plates of great Extent; each making ſingly the whole ſurface of the maſs.
          - 1. Of viſibly ſeparate plates, of extream thinneſs, and thoſe fiſſile into other finer ones — Speculares 71
          - 2. Of ſeparate plates of conſiderable Thinneſs, and thoſe not fiſſile into others — Hyalinæ 75
        - 2. Compos'd of ſmall plates in form of ſpangles, laid in different directions in the maſs.
          - 1. Each fiſſile into many thinner ones — Bractearia 76
          - 2. Of ſpangles, not fiſſile, or but in a ſlight degree, and only into other yet thick ones — Elaſmides 84
      - 2. Of a fibroſe or thready ſtructure. FIBRARIA.
        - 1. Compos'd of filaments, arrang'd perpendicularly in the maſs, not flexile nor elaſtic, and readily calcining in the fire.
          - 1. Compos'd of continuous filaments — Tricheriæ 89
          - 2. Compos'd of ſhort abrupt fibres — Lachnides 93
        - 2. Compos'd of filaments, arrang'd horizontally in the maſs, flexile and elaſtic, and not calcining readily in the fire.
          - 1. Compos'd of continuous filaments — Aſbeſti 101
          - 2. Compos'd of ſhort abrupt filaments — Amianthi 107
      - 3. Of a granuloſe texture. GYPSUM.
        - 1. Of a firm, compact texture, and conſiderably hard.
          - 1. Compos'd of ſomewhat broad particles, and of a bright cryſtalline luſtre — Pholides 112
          - 2. Compos'd of very ſmall particles, and of a leſs glittering hue — Lepia 113
        - 2. Of a lax, looſe texture, ſoft and crumbly.
          - 1. Bright and glittering — Temachides 114
          - 2. More dull and opake — Claſmia 117
    - 3. Of a regular ſtructure, and determinate figure.
      - 1. Compos'd of ſlender filaments arrang'd into plates, and thoſe forming complex maſſes, which are flexile but not elaſtick, eaſily calcinable, but not ſoluble in acids. SELENITES.
        - 1. Compos'd of horizontal plates, and approaching to a rhomboidal form.
          - 1. Thinner, conſiſting of ten planes — Leptodecarhombes 124
          - 2. Thicker, conſiſting of ten planes — Pachodecarhombes 129
          - 3. Conſiſting of fourteen planes — Tetradecarhombes 133
        - 2. Compos'd of horizontal plates, and of a columnar and angular form.
          - 1. With truncated ends flatted — Iſchnambluces 135
          - 2. With truncated ends, not flatted — Iſambluces 139
          - 3. With pointed ends — Oxuciæ 141
        - 3. Of a ſtriated appearance.
          - Of a ſeemingly fibroſe texture — Inoxuciæ 142
        - 4. Flat, but of no determinately angular figure.
          - Tabulated and reſembling foliaceous talcs — Sanidia 144
        - 5. Form'd of plates perpendicularly arrang'd.
          - Octohaedral, or compos'd of eight planes — Cathetolipes 145
        - 6. Form'd of congeries of plates or fibres, rang'd in form of a Star.
          - 1. Compos'd of filaments arranged into plates — Lepaſtra 146
          - 2. Compos'd of filaments not arranged into plates — Tricheſtra 149
        - 7. Of a complex, and indeterminate figure.
          - Compos'd of various irregular concretions — Symplexia 150
      - 2. Of angular figures, very bright, giving fire with ſteel, and not ſoluble in acids, nor readily calcining. CRYSTAL.
        - 1. Compos'd of an hexangular column, terminated at each end by an hexangular pyramid.
          - 1. With a longer intermediate column — Macroteloſtyla 160
          - 2. With a ſhorter intermediate column — Brachyteloſtyla 162
        - 2. Compos'd of two pyramids join'd baſe to baſe without a column.
          - 1. Of two hexangular pyramids — Pauraedraſtyla 168
          - 2. Of two octangular pyramids — Polyaedraſtyla 171
        - 3. Compos'd of an angular column, terminated at one end by a pyramid, and at the other growing to ſome ſolid body.
          - 1. With thin hexangular columns — Ellipomacroſtyla 172
          - 2. With thick hexangular columns — Ellipopachyſtyla 182
          - 3. With pentangular columns — Oligaedra 185
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          - 5. With ſhort columns and ſlender pyramids, found on or within cryſtalline or ſtony nodules — Arthrodia 189
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          - 2. Of a pyramidal figure with four planes — Caſſiteria 195
          - 3. Of a Rhomboidal figure — Sideria 197
      - 3. Of angular and indeterminate figures, of a cryſtalline appearance, not giving fire with ſteel, ſoluble in acids, and readily calcining. SPAR.
        - 1. Compos'd of an angular column terminated at each end by an angular pyramid.
          - 1. Hexangular columns with hexangular pyramids — Triexaedria 204
          - 2. Pentangular columns with pentangular pyramids — Tripentahædria 207
          - 3. Trigonal columns with trigonal pyramids. — Enneahædria 208
        - 2. Compos'd of two pyramids, joined baſe to baſe without any intermediate column.
          - 1. With octangular pyramids — Dioctahædria 211
          - 2. With hexangular pyramids — Diexahædria 213
          - 3. With trigonal pyramids — Ditrihædria 215
        - 3. Compos'd of angular columns, terminated at the ſummit by a pyramid, but adhering by their baſe to ſome ſolid body.
          - 1. With an hexangular column terminated by an hexangular pyramid — Hexaedroſtyla 218
          - 2. With a pentangular column terminated by a pentangular pyramid — Pentaedroſtyla 220
          - 3. With a trigonal column terminated by a trigonal pyramid — Triedroſtyla 222
        - 4. Compos'd of ſingle pyramids, affix'd to ſome ſolid body by their baſes without any column.
          - 1. With ſingle hexangular pyramids — Hexædrapyramides 225
          - 2. With ſingle trigonal pyramids — Triædrapyramides 226
        - 5. Of a parallellopiped figure.
          - Regular both in their whole maſſes and their conſtituent parts — Parallellopipedia 333
        - 6. Of an irregular figure, but compos'd of rhomboidal concretions.
          - Irregular externally but breaking into rhomboidal maſſes — Anomorhomboidia 337
        - 7. Of an impure texture, and in form of cruſts or thin plates.
          - 1. Semipellucid and ſomewhat bright — Placagnodiaugia 342
          - 2. Dull and opake — Placagnoſcieria 346
        - 8. Of an earthy texture, forming plates or incruſtations;
          - 1. Impure, covering the ſides of fiſſures of Stone — Cibdeloſtracia 349
          - 2. More impure, covering vegetables, &c. in form of incruſtations — Cibdeloplacia 356
        - 9. Form'd into long conical bodies hanging from the roofs of caverns.
          - 1. Of a cryſtalline texture, bright and tranſparent — Stalactagnia 363
          - 2. Of a debas'd texture, leſs bright and tranſparent — Stalactocibdela 367
        - 10. Form'd into ſmall round figures of a cruſtated ſtructure.
          - 1. Of a cryſtalline texture, and pellucid — Stalagmodiaugia 370
          - 2. Of a debas'd texture, and more opake — Stalagmoſcieria 373
        - APPENDIX. Influenced in their figures by metalline particles.
          - 1. Cubic, owing their figure to Lead — Cubidia 376
          - 2. Pyramidal of four planes, influenced by Tin — Tetrædrapyramidia 378
          - 3. Rhomboidal of ſix planes, owing their figure to Iron — Rhomboidia 379
  - 2. Soluble in water, not inflammable.
    - 1. Of an Acrid Taſte.
      - 1. Not inflammable, ſoluble in water, and concreting again into regular Cryſtals. SIMPLE SALT.
        - 1. Found native and pure.
          - 1. Forming pyramidal, cubic, or parallellopiped cryſtallizations — Muria 382
          - 2. Forming flat, oblong cryſtallizations, with four unequal ſides, and two truncated ends — Natrum 387
        - 2. Found in the ſtate of ores, their particles being blended in Earths or Stones.
          - 1. Forming octagonal Cryſtals — Alumen 391
          - 2. Forming long, ſlender, hexaedral Cryſtals — Nitrum 394
        - 3. Found ſuſpended in waters, and in a liquid form.
          - 1. Forming octohaedral Cryſtals — Borax 395
          - 2. Forming oblong quadrangular Cryſtals — Halcryptium 397
  - 3. Inflammable, not ſoluble in water.
    - 1. In a ſolid form.
      - 1. Of a purer texture, and in ſome degree pellucid. PHLOGIDIAUGIUM.
        - 1. Of a lax texture, ſoft and friable.
          - 1. Of a plain and ſimple ſtructure — Sulphura 400
          - 2. Compos'd of plates or flakes like the Talcs — Auripigmenta 403
        - 2. Of a finer texture, and conſiderable hard.
          - 1. Of a coarſe ſtructure, and opake — Zarnichia 406
          - 2. Of a finer ſtructure, and pellucid — Succinum 409
      - 2. Of a coarſer texture, and not pellucid. PHLOGISCIERIUM.
        - 1. Found looſe, and in detach'd maſſes.
          - 1. Soft, fuſible, and of a ſweet ſmell — Ambra 412
          - 2. Moderately hard, and of a grain like that of wood — Gagates 413
          - 3. Hard, but brittle, of no regular grain — Aſphalta 414
        - 2. Conſtituting whole ſtrata.
          - 1. Harder, and breaking with equal eaſe in any direction — Ampelites 416
          - 2. Softer, and ſplitting moſt readily horizontally — Lithauthraces 417
    - 2. In a liquid form.
      - 1. Thinner fluids. GELÆOPSILUM.
        - 1. Of a finer ſtructure.
          - Thinner and pellucid — Naphthæ 418
      - 2. Thicker fluids. GELÆOPACHIUM.
        - 2. Of a coarſer ſtructure.
          - Thicker and opake — Piſſaſphalta 421
- 2. Naturally and eſſentially Compound, and unmetallick.
  - 1. Not inflammable, nor ſoluble in water.
    - 1. Of no regular ſtructure, or determinate figure, and Forming whole ſtrata.
      - 1. Compos'd of argillaceous or marley matter, blended with other particles, and never found pure. COMPOUND EARTH.
        - 1. Compos'd of Sand, and a viſcid clay.
          - 1. Of a more friable texture — Thrauſtomichthes 424
          - 2. Of a more tough and viſcid texture — Gliſchromicthes 427
        - 2. Compos'd of argillaceous or marly particles, with animal and vegetable remains.
          - 1. Of a lax and crumbly texture — Thruptomicthes 429
          - 2. Of a more viſcid texture — Gloiomicthes 430
      - 2. Compoſing beds of great extent, hard and dry, not ſoluble in water, nor oil, nor at all ductile. STONE.
        - 1. Coarſe, harſh, of a lax texture, and viſible gritt, lodg'd in a cementitious matter.
          - 1. Of a plain ſtructure not laminated — Pſaduria 432
          - 2. Of a laminated ſtructure — Ammoſchiſta 443
        - 2. Moderately fine, and even in texture, and of no viſible grit or grain.
          - 1. Of a plain ſtructure not laminated — Sympexia 447
          - 2. Of a laminated ſtructure — Stegania 457
        - 3. Of a fine ſubſtance, elegant ſtructure and great brightneſs, compos'd of Granules, ſometimes more, ſometimes leſs diſtinct, but never lodg'd in any cementitious matter.
          - 1. Compos'd of ſmall concretions, and ſoluble in acids — Marmora 461
          - 2. Compos'd of large concretions, and ſoluble in acids — Alabaſtritæ 489
          - 3. Of an even ſtructure, and not ſoluble in acids — Porphyritæ 494
          - 4. Compos'd of very large irregular concretions, and not ſoluble in acids — Granitæ 498
    - 2. Form'd in detach'd maſſes, of a regular ſtructure, and determinate figure.
      - 1. Form'd by ſimple concretions, and divided by thin partitions into various parcels. SEPTARIA, or waxen vein:
        - 1. Conſtituting large maſſes, of a plain ſimple ſtructure, and divided by thick ſepta.
          - 1. Divided by ſepta of ſpar — Secomiæ 502
          - 2. Divided by ſepta of earthy matter — Gaiophragmia 518
          - 3. Divided by ſepta of Pyritæ — Pyritercia 521
          - 4. Divided by ſepta of Spar and Cryſtal — Diaugophragmia 522
        - 2. Conſtituting ſmaller maſſes, of a cruſtated ſtructure, and divided by thin ſepta.
          - 1. With a roundiſh Nucleus encloſ'd within the body — Brachypyrenia 524
          - 2. With an oblong Nucleus ſtanding out at the ends — Macropyrenia 528
      - 2. Form'd by repeated Incruſtations of earthy and ferrugineous matter. SIDEROCHITUM, or cruſtated ferrugineous body.
        - 1. Thoſe which contain regular and ſolid Nuclei.
          - 1. Having a Nucleus of the ſame matter with the cruſts — Empherepyræ 532
          - 2. Having a Nucleus of a different matter from the cruſts — Heteropyræ 535
        - 2. Thoſe which contain ſoft or fluid matter inſtead of Nuclei.
          - 1. Containing earthy matter — Geodes 541
          - 2. Containing an aqueous fluid — Enhydri 544
    - 3. Form'd in detach'd maſſes, of no determinate figure, or regular ſtructure, and compos'd of Cryſtal or Spar debas'd by earth.
      - 1. Found in large detach'd maſſes without cruſts, and compos'd of variouſly debas'd cryſtalline matter. SCRUPI.
        - 1. Thoſe of a more rude, and irregular ſtructure in the maſs.
          - 1. Of a glittering appearance, containing flakes of Talc, and emulating the nature of the Granites. — Telaugia 547
          - 2. Compos'd of a ſtony matter, making a kind of cement, and holding together Pebbles or other nodules. — Lithozugia 557
        - 2. Thoſe of a more equal and regular conſtruction.
          - 1. Of an uniform ſtructure, of no great variety of colours, and emulating the appearance of Pebbles. — Petridia 563
          - 2. Of a complex irregular ſtructure, of great variety of colours, and reſembling the Marbles. — Jaſpides 573
      - 2. Of a ſlightly debas'd cryſtalline matter, of great beauty and brightneſs, and a moderate degree of tranſparence uſually and found in ſmall maſſes. SEMIPELLUCID GEMMS.
        - 1. Of but few variegations, and frequently of one plain ſimple colour, tho' ſometimes vein'd.
          - 1. Of a plain ſtructure, not cruſtated nor tabulated, and uſually of one ſimple colour. — Sardæ 458*
          - 2. Variegated with different colours in form of miſts or clouds. — Chalcedonii 462*
          - 3. Of an opake hue, but becoming lucid on being immers'd in water. — Hydrophanæ 468*
          - 4. Of an opake hue, till held againſt a ſtrong light. — Pramnion 470*
        - 2. Remarkable for their Zones, veins and variegations.
          - 1. With veins and clouds, but without Zones, not form'd of incruſtations, nor made up of plates. — Achatæ 473*
          - 2. Compos'd of narrow Zones, and made up of incruſtations, or plates bedded in the common matter of the maſs — Onyches 490*
          - 3. Variegated with Cornelian, and made up of narrow Zones, or plates contained in the common matter of the Stone. — Sardonyches 494
          - 4. Compos'd of broad and thick Zones or plates, with no other matter to mix with or cover them. — Cameæ 498*
      - 3. Of a conſiderably debaſed cryſtalline matter, covered with an opake cruſt, and of great beauty and brightneſs, tho' but a ſlight degree of tranſparence. LITHIDIUM.
        - 1. Compos'd of cryſtalline matter, debas'd by only one kind of earth.
          - Debas'd by one peculiar earth, and free from veins. — Silex 506*
        - 2. Compos'd of cryſtalline matter, debas'd by various earths
          - 1. Of one ſimple colour. — Homochroa 508*
          - 2. Of great variety of colours. — Calculi 512*
      - 4. Found in ſmall diſunited particles making together a ſort of looſe powder. CONISSALÆ.
        - 1. Seeming original concretions.
          - Compos'd of regular particles in their native form — Arenæ 545*
        - 2. Seeming fragments of larger maſſes.
          - 1. Compos'd of mutilated particles, injur'd by accidents originally connected, or intended to be connected in Stone. — Saburræ 569*
    - 4. Of a fine pellucid ſubſtance not ſoul'd by earth.
      - 1. Extreamly hard, pellucid, and of the greateſt luſtre and beauty of all Foſſils. PELLUCID GEMM.
        - 1. Of invariable colours.
          - Of one ſimple and permanent appearance in all light — Chroſtaſima 585*
        - 2. Of changeable colours.
          - Of variable colours as view'd in different lights — Chroaſtaces 599*
  - 2. Soluble in water, not inflammable.
    - 1. Containing Metals, and of nauſeous acrid taſtes.
      - 1. Not inflammable, but fuſible by fire, ſoluble in water, and concreting again into regular figures. METALICK SALT.
        - 1. Found naturally in a ſolid form.
          - 1. Of an even and regular ſtructure — Vitriola 603
          - 2. Of a coarſe and irregular ſtructure, hard and impure — Chalcantha 605
        - 2. Naturally in a liquid form.
          - Suſpended in water — Vitriolum Cæruleum 608
  - 3. Inflammable, not ſoluble in water.
    - 1. Forming whole ſtrata.
      - 1. Not found in looſe maſſes. MARCASITA.
        - 1. Of an obſcurely foliaceous ſtructure.
          - Bright and irregularly foliaceous — Marcaſitæ 610
    - 2. Form'd in detach'd maſſes.
      - 2. Forming detach'd maſſes of no determinately angular figure. PYRITES.
        - 1. Of a plain and ſimple internal ſtructure.
          - 1. Of a ſimple internal ſtructure, and cover'd with a cruſt — Pyriplaces 612
          - 2. Of a ſimple internal ſtructure, without a cruſt — Gymnopyres 614
        - 2. Of a regularly ſtriated, internal ſtructure.
          - 1. Of a ſimple ſtriated texture — Pyritricha 615
          - 2. With ſtriæ, terminating in foliaceous ends — Pyritrichiphyla 617
      - 3. Forming detach'd maſſes of determinately angular figures. PHLOGONIUM.
        - 1. Of ſix plains.
          - Of a cubic figure — Pyricubia 619
        - 2. Of eight plans.
          - Of an octohædral figure — Pyroctogonia 620
        - 3. Of twelve plains.
          - Of a dodecahædral figure — Pyripolygonia 621
- 3. Metallick.
  - Hard, and remarkably heavy.
    - 1. Fuſible by fire.
      - 1. Imperfectly metallick. ASPHURELATUM.
        - 1. Fuſible by fire, and not malleable in their pureſt ſtate.
          - 1. Of a ſtriated texture when melted from the ore — Antimonium 622
          - 2. Of a plated texture when melted from its ore, very brittle, and of a ſilvery white — Biſmuthum 624
          - 3. Affording by calcination a fine blue powder — Cobaltum 624
          - 4. Of a plated texture when melted from its ore; brittle when cold, tho' ductile when warm, and of a ſomewhat blueiſh white. — Zincthum 625
          - 5. Of a fluid texture when ſeperated from its ore — Hydrargyrum 625
      - 2. Perfectly metallick. METALLUM.
        - 1. Fuſible by fire, and malleable when pure.
          - 1. The lighteſt in ſpecifick gravity of all the metals — Stannum 628
          - 2. The ſecond of the metals in ſpecifick gravity — Ferrum 629
          - 3. The third of the metals in ſpecifick gravity — Cuprum 632
          - 4. The fourth of the metals in ſpecifick gravity — Argentum 634
          - 5. The fifth of the metals in ſpecifick gravity — Plumbum 635
          - 6. The heavieſt of the metals — Aurum 636

To theſe by Way of APPENDIX are added, Accounts of the Extraneous FOSSILS, or Animal and Vegetable Bodies accidentally bury'd in the Earth.

THE HISTORY OF FOSSILS.

PART the FIRST.

BOOK I.

FOSSILS naturally and eſſentially ſimple, not inflammable, nor ſoluble in water.

Series the firſt.

Thoſe of no regular ſtructure or determinate figure.

The Foſſils of this ſeries are comprehended in one claſs.

The ſimple earths.

Foſſils are native ſubſtances found either bury'd in the earth, or lying on its ſurface, of a plain ſimple ſtructure, and ſhewing no ſigns of containing veſſels or circulating juices.

The firſt claſs of theſe; The ſimple earths are friable, opake, inſipid bodies; not inflammable, vitrifiable by extream heat, diffuſible in water, and ſeparable from it by filtration.

Of theſe nature affords us two orders, and under thoſe five Genera.

Order the firſt.

Earths naturally moiſt, of ſmooth ſurfaces, and a firmer texture.

Order the ſecond.

Earths naturally dry, of rough duſty ſurfaces, and a looſer texture.

EARTHS.
Order the firſt.

Genus 1. BOLES. *Earths moderately coherent, ponderous, ſoft, not ſtiff or viſcid. But in ſome degree ductile while moiſt, compos'd of fine particles, ſmooth to the touch, eaſily breaking between the fingers, readily diffuſible in water, and freely and eaſily ſubſiding from it.*

Genus 2. CLAYS. *Earths firmly coherent, weighty and compact, very ſtiff and viſcid, ductile to a great degree while moiſt, ſmooth to the touch, not eaſily breaking between the fingers, nor readily diffuſible in water, and when mixed in it, not readily ſubſiding from it.*

Genus 3. MARLES. *Earths but ſlightly coherent, not ductile, ſtiff or viſcid while moiſt, moſt eaſily diffuſible in, and diſunited by water, and by it reduced into a ſoft, looſe, incoherent maſs.*

EARTHS.

Order the ſecond.

Genus 1. Ochres. *Earths ſlightly coherent, compos'd of fine, ſmooth, ſoft, argillaceous particles, rough to the touch, and readily diffuſible in water.*

Genus 2. Tripelas. *Earths firmly coherent, compos'd of fine, but hard particles, and not readily diffuſible in water.*

Theſe are the Genera of ſimple Earths. The compound ones are the loams and the vegetable moulds; but, beſide theſe, there are frequently found in digging, a kind of Terræ Miſcellæ, of no determinate ſpecies, nor to be known by any peculiar name, being compos'd of maſſes of different ſizes, of different ſpecies of Earths, broken from off their ſtrata, ſoon after their formation, and blended together at the time of the original ſubſidence of the ſtrata.

FOSSILS.

CLASS I.

Order I. Genus I.

BOLES.

Sect. I. The white BOLES.

1. *Bolus alba puriſſima, quæ Bolus Armena alba authorum.* *Pure white Bole, the white Bole Armenic of authors.*

THIS is the Bolus Armena Alba. Mont. Exot. 13. and of Dale's Pharmacolog. 17. It is a fine, ſoft, and pure Earth; moderately heavy; of a cloſe, compact texture, and very ſmooth ſurface; and in colour of a clean bright white; it adheres firmly to the tongue, is very ſoft to the touch, and does not ſtain the ſkin in handling; it breaks eaſily between the fingers, melts ſlowly in the mouth, is inſipid to the taſte, and leaves an unctuous ſmoothneſs on the tongue, without giving the leaſt harſhneſs between the teeth.

View'd thro' the Microſcope it ſhews a perfectly ſimple, ſmooth, equal, and regular texture.

It makes no effervescence with Aqua Fortis.

In burning by a moderate heat it acquires a conſiderable hardneſs without any change of colour, and by extreme force of fire is converted into a fine whitiſh grey glaſs.

It is dug in the eaſtern parts of Armenia, but in no great quantities, there being no more than a ſingle ſtratum of it now known or work'd, which lies in different parts at the depth of four, five, or ſix feet. It is eſteem'd a Sudorific and an Aſtringent, but is unknown in our ſhops.

It ſeems the moſt of all natural ſubſtances to approach to the nature of pure and ſimple Earth.

2. *Bolus alba friabilis.* *White friable Bole.*

This is a very pure and ſoft Earth, but of a deader white than the Armenian, and ſomething dryer and of a leſs cloſe texture; it is moderately heavy, of a ſmooth polite ſurface, and ſcarce at all ſtains the ſkin in handling. It is brittle, and apt to crumble between the fingers, it adheres but ſlightly to the tongue, is ſoft and ſmooth to the touch, and melts ſlowly in the mouth, leaving a ſenſible tho' not very conſiderable grittyneſs between the teeth.

View'd thro' the Microſcope it appears to be a little cavernous, or of a ſomewhat leſs compact texture than the Armenian, and is ſeen to contain a ſmall quantity of a very fine white ſand.

It raiſes a very conſiderable effervеſcence with Aqua fortis.

In burning it becomes whiter, lighter, and more crumbly than before, and acquires ſomething of the acrimony of lime. In a violent fire it runs to a pale blue glaſs.

It is dug near Frankfort, in the neighbourhood of Oppenheim, and in ſome other parts of the German dominions. It is us'd in the ſhops there as a Sudorific, Alexipharmic and Aſtringent, and is with ſome in great eſteem in ſpittings of blood, and in ulcers of the lungs.

3. *Bolus alba ponderoſa durior, quæ terra Noceriana authorum.* *Hard, heavy, white bole, the Nocerian earth of authors.*

This is the Terra Noceriana. Mont. Exot. 14. Terra Bezoartica de Nocera ſpecies Terræ Lemniæ. Bocc. Muſ. de Fiſic. 61.

It is a denſe, compact Earth, very heavy, and of a ſomewhat greyiſh white, of a very ſmooth ſurface, not breaking ſo eaſily as moſt of the other Boles, nor at all ſtaining the fingers in handling; when taſted it is perfectly inſipid; it melts very readily in the mouth, but ſticks pretty firmly to the tongue if apply'd to it in the lump; when ſuffer'd to break in the mouth, it leaves a laſting ſmoothneſs on it, tho' not without ſome little grittyneſs between the teeth.

View'd thro' the Microſcope it appears, tho' very compact, yet not equally ſo in all parts, but of a leſs regular texture than that of moſt of the other Boles, and has always incorporated with it a ſmall quantity of a very fine greyiſh white ſand.

It raiſes no effervеſcence with Aqua Fortis.

In burning it acquires a purer white with very little additional hardneſs, and in a very fierce fire runs into a white but coarſe glaſs.

It is dug principally near Macerata, a city in the marquiſate of Ancona in the Pope's territories, and is found in ſmall quantities in ſome other parts of Italy. And is in great eſteem there in malignant fevers, and againſt the bites of venomous Animals.

4. *Bolus alba levis, quæ terra Lemnia alba authorum.* *Light, white bole, the white Lemnian Earth of authors.*

This is the Terra Lemnia Alba Sigillata, Charlt. Foſs. 5. Terra Sigillata Lemnia Alba. Worm. 9. Terra Lemnia vel Sigillata Candida Kentm. 1. Terra Sigillata Turcica Alba. Mont. Exot. 14.

It is an Earth of a very pure white, but of a leſs firm and compact texture, and leſs weighty than any of the former; it is of a tolerably ſmooth ſurface to the eye, but in rubbing, it feels ſomewhat duſty; it ſcarce at all ſtains the fingers in handling, eaſily breaks to pieces, adheres ſtrongly to the tongue, and melts readily in the mouth, but leaves a grittyneſs and ſenſation of hard particles between the teeth.

View'd thro' the Microſcope in its natural ſtate, it ſhews a looſe, ſpungy texture, full of innumerable little cavities, many of them containing ſmall particles of a fine white ſand; when waſh'd and prepar'd for medicinal uſe, it is yet more looſe and ſpungy, but is then free from ſand.

It makes no effervеſcence with Aqua Fortis.

In burning it acquires a conſiderable hardneſs without change of colour, but by a violent fire is converted into a very pale blue glaſs, very clear and tranſparent.

It is dug in the iſland of Lemnos, and us'd in the German ſhops in Dyſenteries, Hæmorrhages and malignant Fevers. The antients knew this Lemnian Earth as well as the red, but never brought it into uſe in medicine, probably becauſe they thought the other ſuperior to it in virtue, but uſed it as they did the Cimolia, and other white Earths, to clean woollen and linen clothes.

Galen expreſly tells us, that there were three kinds of Lemnian Earth, one medicinal which only one prieſt might touch, another which was a true Reddle and was uſed by carpenters, &c. and a third which was of a cleanſing nature, and was employ'd by thoſe who clean'd linnen and woollen clothes: It is evident that this laſt cou'd be of no other colour than white.

It is frequently brought to us made into little cakes and ſeal'd, as are indeed almoſt all the true medicinal Earths, as well as a multitude of counterfeit ones: The ſame Earth, however, is often ſeal'd with different impreſſions, and different Earths with the ſame; theſe marks therefore as they are alſo ſometimes affixed to counterfeits, can be of no uſe to the naturaliſt, or indeed to the trader, and are therefore of no conſequence nor worthy mentioning here, where the intent is to give ſuch characters of all the genuine Earths as they may be known by, whatever arbitrary impreſſion or external form they are made to carry.

5. *Bolus albo grizea, pura, friabilis, quæ terra ſigillata Goltbergenſis authorum.*

Greyiſh-white, pure Bole, called earth of Goltberg.

This is the Bolus Candida Lignicenſis, ſeu Sigillata Goltbergenſis, Charlt. Foſs. 5. Worm. Muſ. 10. Bolus Candida Lignicenſis, Schw. Foſs. 397. Terra Sigillata Lignicenſis, Schrod. 318. and the Axungia Lunæ of the chemiſts.

It is an earth moderately compact and denſe, ſomething lighter than the true Armenian, but conſiderably heavier than the Lemnian; of a dull, duſky, greyiſh white, and a tolerably ſmooth and polite ſurface, not at all ſtaining the hands in rubbing, and eaſily breaking between the fingers; it firmly adheres to the tongue, and when taſted melts eaſily in the mouth; is perfectly fine, as the true Armenian, and leaves not the leaſt ſenſation of hardneſs, harſhneſs, or grittyneſs between the teeth.

View'd through the Microſcope, it appears of a ſimple, pure, fine, and uniform texture.

It raiſes no effervеſcence with Aqua Fortis.

In burning it becomes harder, and conſiderably whiter than before, and in a violent fire is converted into a coarſe white glaſs.

It is dug in many parts of Germany, but particularly at this time near Haſſelt in the biſhopric of Liege, in the circle of Weſtphalia; where it is taken up in conſiderable quantities, and is uſually ſealed with the impreſſion of an eagle, but with its old name of Goltbergenſis under it. It is imagined to contain ſome particles of ſilver, and is us'd in the ſhops as an Aſtringent, a Cordial, and a Sudorific.

6. *Bolus pura albo-ſublutеſcens, quæ terra alba magni Ducis authorum.*

Yellowiſh-white, pure Bole, the white Tuſcan Earth of authors.

This is the Terra Sigillata Alba Magni Ducis. Mont. Exot. 13. Dale Pharm. 18. It is a moderately denſe and compact Earth, conſiderably heavy, and of a dull deadiſh white, which in drying acquires ſome ſmall degree of yellowiſhneſs, of a very ſmooth ſurface, not at all ſtaining the hands, nor eaſily breaking between the fingers, it adheres but ſlightly to the tongue, and melts very readily in the mouth, has ſomething leſs ſmoothneſs to the taſte than moſt of the other Boles, but leaves not the ſlighteſt grittyneſs between the teeth.

View'd before the Microſcope, its texture appears plain, equal and compact.

It raiſes a ſlight effervеſcence with Aqua Fortis.

In a moderate fire it burns to a pure white, without any conſiderable additional hardneſs: And in a violent one, is converted into a ſpungy light glaſſy ſubſtance, of a pale ſea green, with a yellowneſs in ſome parts of it.

It is dug in many parts of Italy, but now particularly in the neighbourhood of Florence, where there is a ſtratum of it of eight or ten foot thick, at the depth of five or ſix from the ſurface. It is given as a Sudorific, and eſteemed a great medicine in fevers attended with Diarrhœas.

7. *Bolus alba ponderoſiſſima mollis quæ terra Melitenſis Officinarum.*

White, ſoft, heavy Bole, called in the ſhops Malta Earth.

This tho' now commonly called Malta Earth in the ſhops, is not the Earth mentioned by authors under the name of Terra Melitenſis, that being a marle to be hereafter deſcribed in its proper place.

This is a true Bole, of a very cloſe compact texture, very weighty, of a pure white when dug, but becoming of yellowiſh or cream colour when expoſed to the air, of a moſt polite ſmooth and ſhining ſurface, ſcarce at all ſtaining the hands, but brittle and eaſily crumbling between the fingers: It adheres very ſtrongly to the tongue, and melts readily in the mouth, but leaves a little hardneſs between the teeth.

View'd thro' the Microſcope it appears of a moſt pure, equal, and uniform texture.

It raiſes no effervеſcence with Aqua Fortis.

In a common fire it burns to a perfect whiteneſs and conſiderable hardneſs; but urged by a more violent one it becomes a duſky greyiſh white, but very impure glaſs.

It is dug in many parts of the iſland, from whence it has its name, and us'd in the German ſhops, as a Cordial and Sudorific, and a remedy againſt venemous bites.

8. *Bolus alkalina ſubcinerea, quæ terra Eretria authorum.*
Whitiſh Alkaline Bole, the Eretrian Earth of authors.

This is the Terra Eretria. Math. 1392. Terra Eretria cinerea Ultramarina qua Medici Utuntur. Kent. 1. Eretria Terra Plin. L. 35. P. 686. and the grey Eretrian Earth of Dioſcorides and Galen.

It is a fine and pure Earth, of a greyiſh white, moderately heavy, and of a ſmooth polite ſurface, not ſtaining the hands, and readily crumbling between the fingers; it adheres firmly to the tongue; and melts eaſily in the mouth, leaving a laſting ſmoothneſs on it, without the leaſt harſhneſs between the teeth.

View'd thro' the Microſcope, it ſhews an equal and regular texture.

It raiſes a very briſk effervefcence with Aqua Fortis.

It burns to a perfect whiteneſs, acquiring a ſtony hardneſs and an acrimonious taſte, and in a violent fire runs into a very pure pale blue glaſs. But what abundantly diſtinguiſhes it from all other Earths is, that if a little wetted and drawn over a plate of braſs or copper, ſo as to mark a line, the mark will in a little time appear blueiſh. This is a character originally recorded of it by Dioſcorides, and ſince copied from him by many other authors; it has appear'd to many a ſtrange quality in an Earth, and been doubted by ſome, but experiments ſhew the accounts to be true; and indeed it will appear the leſs wonderful, when we conſider, that it appears by its fermenting ſo ſtrongly with Aqua Fortis, to be manifeſtly a powerful Alkali, and that all Alkali ſalts readily draw a blue tincture from that metal; but ſince neither Chalk, nor any of the other Alkaline Earths will do this, it is evident that this poſſeſſes that quality in a degree much ſuperior to them all.

It is dug in the Negropont, near the ancient Eretria, and might be had in quantities if it were brought into uſe in medicine, as it anciently was; and its pecular Alkaline quality might very well recommend it to be at preſent.

The ancients were extreamly careful in their manner of preparing it for Uſe; a deſcription of the method is given at large by Dioſcorides, and amounts to a very fine way of levigating, analogous to that by which we now prepare our teſtaceous powders. It ſtands recommended as a noble Aſtringent and Sudorific.

The ancients mention another Eretrian Earth of a pure white, but this was in reality no other than the true white Bole of Armenia.

9. *Bolus albo grizea alkalina durior.*
Hard whitiſh alkaline Bole.

This is a hard, cloſe, compact Earth, of a bright white, but not without ſome ſmall mixture of greyiſhneſs, of an even and plain but not polite ſurface, breaking very difficultly between the fingers, and not ſtaining the hands, unleſs when freſh broken. It adheres but ſlightly to the tongue, is more readily diffuſible in water than moſt other Boles, and melts gradually in the mouth into a ſmooth ſubſtance, but not without leaving ſomething of grittyneſs between the teeth.

The Microſcope ſhews it of a regular, but a leſs ſmooth ſurface than many of the other Boles.

It effervefces ſlightly with Aqua Fortis.

In a moderate fire it burns to a pure white, with but little additional hardneſs, and no ſenſible acrimony. In a violent fire it becomes a light ſpungy and greeniſh half vitrify'd maſs.

It is found on the ſurface of the earth near Bengal, and in many other parts of the Eaſt Indies; and after it has undergone three calcinations, is us'd by the natives in fluxes and fevers with great ſucceſs.

Theſe are all the white Boles mentioned by the ancients, or introduced into Uſe by later Ages; and however alike they might appear to one another on a curſory view, or cloſer examination, experiments ſhew them to be all manifeſtly different ſubſtances, and evidently ſo many diſtinct ſpecies of Earths. I am ſenſible that the accounts hitherto given of them by authors, very little diſtinguiſh them from one another; and that nothing but deſcriptions made from the bodies themſelves, and experiments made on them could have done it. What are their real uſes in medicine remains with us yet to try, for at preſent they are in a manner unknown in our ſhops; but if we were inclin'd to give them a trial, it is very evident, that any of them that ſhou'd be found of uſe, might yet eaſily be had: Since I have myſelf had the good fortune with no great difficulty to procure them all; ſome from the places where they are produced, and others from the German Shops where many of them are yet in uſe and much eſteem'd.

SECT. II. The yellow BOLES.

1. *Bolus lutea puriſſima ponderoſa, quæ Bolus Armena vera Galeni. Bolus Armena lutea authorum.*

Yellow, heavy, pure Bole, the Bole Armenic of Galen; and the yellow Bole Armenic of other authors.

THIS is the Bolus Armena naturalis flava. Aldr. Muſ. Met. 270. Bolus lutea Theophraſti. Kentm. 7. Bolus Armena lutea. Mont Exot. 13.

It is a very elegant and beautiful Earth, of a cloſe compact texture, extreamly ſmooth ſurface, and very hard; it is more ponderous than moſt of the yellow Earths, very ſoft to the touch, and does not readily break between the fingers, nor at all ſtain the hands; it is pretty readily diffuſible in water, and remains long ſuſpended in it, it adheres firmly to the tongue, melts ſlowly in the mouth, is of a very manifeſtly Aſtringent taſte, and perfectly pure as the white Armenian, giving not the leaſt ſenſation of hardneſs or grittyneſs between the teeth.

The Microſcope ſhews it to be of a moſt cloſe, equal and regular texture.

It makes a very briſk efferveſcence with Aqua Fortis.

In the fire it acquires a conſiderable hardneſs, and burns to a much deeper colour, but without the leaſt tendency to redneſs; and if urg'd by a very violent one is converted into a deep blueiſh green glaſs.

In regard to the place where this is to be found, there have been ſome differences among authors. Ætius affirms, that the Armenian Earth was dug in the mountain Baganaſa in Armenia. Cardan will have it only to have been from the iſland of Samos, and others from other places in that part of the world. I have nothing to object to the ſame Earths being found in Samos and other places, but am very certain Cardan need not for that reaſon have deny'd it to Armenia, for my own ſpecimen was from that place, where there is now a pit of it of near thirty foot depth, the Bole making the loweſt ſtratum, and lying clean and pure to three or four feet thick, under ſix or ſeven other different ſtrata; the pit is in the mountains to the North Eaſt of Erzeron, and at about ſeventeen miles diſtance from that city, and a vaſt quantity of the Earth is annually dug there.

Aldrovandus mentions, that in his time a dry yellow Earth was brought from Armenia, and believ'd to be the true Bole of Galen; and notwithſtanding that we are us'd from the Accounts of later writers to know a red and not a yellow Earth by the name of Bole Armenic; it is evident to me that this very Earth is the true ſubſtance that deſerves that name, provided we mean by it as we always ſay we do, the Bole of Armenia brought into uſe by Galen in the time of the terrible plague at Rome, which he was ſo ſucceſsful in treating. The deſcription of that author plainly agrees with this Earth in every particular; he ſays, it was of a dry nature, a pale yellow colour, and ſo hard, that the perſon who gave it to him ignorantly thought it a ſtone; and adds, that it was heavier than the Samian Earth, and of a more denſe texture, and had not the leaſt hard or gritty particle in it; and every part of this deſcription punctually agrees with the ſpecimen I have of it, and with all the Earth now brought from that place.

It is perhaps the beſt medicine of all the Earths. I have myſelf try'd it in many caſes, and always found it to be a moſt valuable Aſtringent: Authors in general commend it alſo as an Alexipharmic and Sudorific; and Galen ſays, that it often ſuddenly cured the terrible diſeaſe in which he gave it; and adds, that thoſe whom it did not cure, were relieved by no other medicines.

If the preſent practice would encourage the uſe of this excellent drug, it might be eaſily had in any quantities, for much of it is continually imported into Germany, from whence ſome at times ſtraggles to us; and when it does ſo is always ſold by our Druggiſts under the name of the Bole of Blois, to be next mentioned: This is indeed a very natural error as it really much reſembles that Earth, and we have now taught ourſelves never to look for a yellow Bole Armenic, the reddiſh Bole of Avicenna to be deſcrib'd hereafter having long paſs'd with the moſt judicious for the true Bole Armenic; and this it may be obſerv'd is no ſmall misfortune, ſince that being a much ſcarcer Earth than this, is never ſeen among us, but a thouſand villainous ſophiſtications palm'd upon us in its place.

2. *Bolus puriſſima pallide flaveſcens levis, quæ Bolus Bleſenſis authorum. Pure and light pale yellow Bole, call'd Bole of Blois.*

This is the Bolus Bleſenſis. Ind. Med. 21. Dale Pharm. 17. It is a moſt pure and beautiful Earth, of a regular and compact texture, yet very light; in colour it is of an extream pale yellow, and that not without ſome faint bluſh of reddiſhneſs among it, of a ſmooth and tolerably polite ſurface, but much leſs ſo than the precedent, eaſily crumbling between the fingers, but not at all ſtaining the hands; it is very readily diffuſible in water, adheres firmly to the tongue, and melts readily and pleaſingly in the mouth; where it ſhews itſelf to be perfectly pure, leaving not the leaſt ſenſation of harſhneſs between the teeth.

Before the Microſcope, it appears of a ſomething looſe but regular texture.

It raiſes a violent efferveſcence with Aqua Fortis, and in the fire acquires an almoſt ſtony hardneſs and much darker colour, but with no additional redneſs. Urg'd by a very violent one, it is converted into a pellucid glaſs of a very pale whitiſh blue.

It is dug in France about Saumur, Blois, and Bourgogne, where it lies in different places from five to eighteen feet deep; and from whence it might be had in quantities if we would bring it into uſe, as I am well convinc'd by often repeated experience, that it much deſerves.

It is a powerful Aſtringent, and promiſes fair for poſſeſſing all the virtues of the true Bole Armenic of Galen.

I cannot but obſerve here, that it is a very unhappy thing, that when there are ſo many good Boles to be eaſily had, the people concern'd in theſe things ſhould neglect all opportunities of getting them, and content themſelves with ſuch miſerable counterfeits as we have now commonly in uſe under their names; this, however, I look upon to be principally the fault of our Druggiſts; for I am unwilling to think any of my own profeſſion would ſcruple the price of a drug ſo very cheap as the beſt of theſe might very well be ſold, if it were to be had at all.

If the Druggiſts of this nation however are much to blame in this reſpect, the French are ſurely infinitely more ſo, who tho' they have this excellent Bole in their own country, will not be at the expence of carriage for it, but conſtantly uſe their common red Bole which is found about Paris, and which is greatly inferior to this in all reſpects in its place, and even under its name.

3. *Bolus puriſſima lutea friabilis, quæ Bolus Toccavienſis authorum. Friable, yellow, pure Bole, call'd Bole of Tokay.*

This is the Bolus Toccavienſis, Charlt. Foſſ. 5. Worm. Muſ. 2. The Bolus Hungarica of Crato. Bolus Tockaika Schwenſf. 370. and the Bolus pannonica vera, Kentm. 7.

It is a very fine and valuable Earth, conſiderably heavier than the Bole of Blois, but leſs weighty than the Armenian, of a texture moderately compact yet very friable, and in colour of a deeper yellow than either of the former; it is of a fine, even, ſmooth ſurface, breaking very eaſily between the fingers, and not ſtaining the hands, readily diffuſible in water, and quickly and eaſily melting in the mouth; it is perfectly pure without the leaſt grittyneſs, and ſtrongly adheres to the tongue if apply'd to it in the lump.

The Microſcope ſhews it to be of a much more compact texture than that of Blois.

It ferments violently with Aqua Fortis.

It acquires a conſiderable hardneſs in the fire without much change of colour, and in a very fierce one is converted into a fine clear pale green glaſs.

It is dug about Tokay in Tranſylvania, and eſteem'd, and I believe very juſtly, a powerful Aſtringent. Crato thought it ſuperior even to Galen's Bole Armenic, and had a great opinion of it in malignant fevers.

4. *Bolus ſloride lutea dura, quæ Terra Lemnia flava Officinarum.* *Hard, bright yellow Bole, call'd yellow Lemnian Earth.*

This is a pure, genuine and very valuable Earth, common in the ſhops in other nations, and ſometimes is ſeen among us.

It is a pure and very fine Bole, of a bright, lively and florid yellow, not at all reſembling that of any of the other yellow Boles, but rather approaching to that of the brighter yellow Ochres; it is of cloſe, compact, denſe texture, very heavy, and of a ſmooth gloſſy ſurface; 'tis of much the ſame hardneſs with the true yellow Bole Armenick. It does not break without difficulty between the fingers; and tho' of ſo florid a colour, never ſtains the hands; it readily melts in the mouth without the leaſt grittyneſs, and if apply'd to the tongue, adheres firmly to it.

The Microſcope ſhews it to be of a pure, even, and regular texture.

It makes no efferveſcence with Aqua Fortis, and in the fire acquires a conſiderable hardneſs, and duſky colour. Urg'd by a very violent one, it becomes a very white but coarſe glaſs.

It is dug in the iſland of Lemnos, and conſtitutes the ſtratum over the red Lemnian Earth, to be deſcribed hereafter, but in ſome places between the two there is a thin ſtratum of an Earth, of a middle nature and mixt colour between both.

It is a Sudorific, Aſtringent and Vulnerary, but is very frequently counterfeited where in uſe; the more common ſophiſtications of it are of two kinds, the one made of a yellow Ochre, which is eaſily diſcoverable, by its ſtaining the hands; and the other of a denſe yellow clay, which may be known by its weight and duſky colour; for tho' the genuine is very heavy for a Bole, yet this counterfeit is ever much more ſo: the colour of the native Earth is alſo not eaſily come up to.

5. *Bolus aurea friabilis, quæ Terra Lignicenſis lutea authorum.* *Gold coloured friable Bole.*

This is the Terra Lignicenſis Sigillata lutea. Charlt. 225. Muſ. Calc. 114.

It is an impure Earth, of a bright and ſtrong yellow; or as Charlton very properly expreſſes it, a gold colour, but is of a looſe and more crumbly texture than moſt of the other Boles. It is moderately heavy, of a ſmooth gloſſy ſurface, eaſily broken between the fingers, and not ſtaining the hands. It is readily diffuſible in water, and melts eaſily in the mouth, but always leaves ſome little grittyneſs between the teeth.

The Microſcope ſhews it to be of a cavernous, looſe, irregular texture.

It makes no efferveſcence with acids.

In the fire it acquires a little additional hardneſs, and a pale brown colour; and urg'd by a violent one, it affords a ſpungy, duſky blue glaſs.

It is dug in many parts of Germany, particularly about Emeric, in the circle of Weſtphalia; and is frequently uſed in Cordial and Aſtringent electuaries. It is often made a Succedaneum for the yellow Sileſian Bole, of which they are very fond, nor indeed are they much leſs ſo of this.

6. *Bolus luteo fuſca, quæ Terra ſigillata Sileſiaca authorum.* *Browniſh yellow Bole.*

This is the Terra Sileſiaca Sigillata quæ Chymicis Axungia Solis dicitur. Charlt. Foſſ. 6. Terra Sigillata Sileſiaca Worm. 2. Hoffm. 664. Terra Sigillata Sileſiana. Imper. 128. Bolus Sileſian. Muſ. Calc. 110.

It is a pure Bole, conſiderably heavy, of a moderately compact texture, and of a dead browniſh yellow colour; it is eaſily broken between the fingers, does not at all ſtain the hands, and has a ſmooth ſurface, but leſs gloſſy than many other of the Boles. It is readily diffuſible in water, melts eaſily in the mouth, and leaves no grittyneſs between the teeth.

The Microſcope ſhews it to be of an equal texture, and regularly laminated, or compos'd of a number of thin plates, laid cloſe on one another, which are in reality ſo many very thin ſtrata.

It makes no efferveſcence with Aqua Fortis.

In a moderate fire it burns to a kind of chocolate colour, acquiring a conſiderable hardneſs: And in a very violent one is converted into a ſpungy, greyiſh green glaſs.

It is found in the perpendicular fiſſures of the rocks, near the gold mines, at Strigonium in Hungary, and is imagin'd to be impregnated with the ſulphur of gold; however that be, it is a good Aſtringent, and a much better medicine in all the intentions where Bole is required, than either the red Bole of the ſame place, or any thing we commonly ſee in the ſhops under that name.

7. *Bolus flavo rubicunda friabilis levis, quæ Terra ſigillata Livonica lutea authorum.*

Light, friable, reddiſh yellow Bole, call'd yellow ſeal'd Earth of Livonia.

This is the Terra Livonica lutea Sigillata Aldr. Muſ. Met. 267. Dale Pharm. 17.

It is a pure and perfectly fine Bole, conſiderably heavy, of a ſhattery friable texture, and of a dull duſky yellow, with commonly ſome faint bluſh of reddiſhneſs in it, of a very ſmooth and gloſſy ſurface, eaſily broke between the fingers, and not ſtaining the hands; it adheres ſtrongly to the tongue, is readily diffuſible in water, and melts very quickly in the mouth, leaving no grittyneſs between the teeth.

The Microſcope ſhews it of an irregular texture, ſometimes vein'd, and at others ſpotted with ſmall dots of red, tho' in other maſſes quite pure, and of an equal yellow throughout, but with a ſlight bluſh of reddiſhneſs thro' the whole.

It ferments not in the leaſt with Aqua Fortis.

In a moderate fire it acquires a ſomething harder texture, and darker colour; and in a violent one becomes a pale greyiſh green glaſs.

It is dug in the place from which it has its name, and in many other parts of the world; and is eſteem'd a better Aſtringent than moſt of the other Boles. It is uſually brought to us in pieces of about a dram weight, ſeal'd with the figure of a church and a ſcutcheon, with two croſs keys. In Spain and Portugal it is alſo much in uſe, they give it there as a Sudorific and Aſtringent, and make a kind of earthen ware of it, of which they are very fond.

8. *Bolus flavo rubicunda denſa ponderoſa, quæ Bolus Bohemica authorum.*

Firm and heavy reddiſh yellow Bole, called Bohemian Bole.

This is the Bolus Bohemica Aldr. Muſ. Met. 271. Bolus Bohemica, Kentm. 7.

It is a very pure and fine Bole, conſiderably heavy, of a compact but unequal texture, and of a ſomething deeper yellow than the Tokay Bole, with a ſlight admixture of reddiſhneſs; it is of a very ſmooth and ſhining ſurface, eaſily breaking between the fingers, not ſo readily diffuſible in water, or melting in the mouth, as many of the other Boles, but when diſſolved, of a fine ſoftneſs, and leaving no harſhneſs between the teeth.

The Microſcope ſhews it compos'd of an almoſt infinite number of thin ſtrata, laid regularly on one another; and this not only in particular pieces, but in all I have ever had an opportunity of examining.

It raiſes no effervеſcence with Aqua Fortis, and acquires a little hardneſs, but without any change of colour in a moderate fire. In a more violent one it is converted into a blue coarſe glaſs.

It is dug in Bohemia in ſeveral different places, and eſteemed an excellent medicine in malignant fevers and fluxes of all kinds.

SECT. III. The Red BOLES.

1. *Bolus rubra duriſſima, quæ Bolus Armena Avicennæ, & Bolus Armena rubra authorum.*

Hard red Bole, the Bole Armenic of Avicenna.

THIS is the Bolus Armena Orientalis. Mont. Exot. 15. Bolus Orientalis. Charlt. 5. Muſ. Calc. 111. Bolus Armena ſive Armeniaca Dougl. Ind. 118. Bolus Orientalis Quibuſdam Armena Worm. Muſ. 11. Bolus ſeu Terra Armenia Aldr. Muſ. Met. 269. Bolus Armenia vera Kentm. 7.

It is a moſt pure and valuable Earth, of a very conſiderable weight, and a cloſe compact texture, it is indeed the hardeſt of all the Boles: in colour it is of ſtrong but ſomewhat yellowiſh red, much approaching to that of ſaffron in the cake; of a ſurface the leaſt ſmooth or gloſſy of all the Boles, difficult to be broken, and ſomething ſtaining the fingers in handling; it is not eaſily diffuſible in water, but in ſmall pieces melts readily enough in the mouth, with a manifeſtly Aſtringent taſte, and not the leaſt grittyneſs; apply'd to the tongue it adheres very firmly to it, and when moiſt looks much darker than before.

Examin'd by the Microſcope it appears of a regular but rough ſurface, and even firm texture.

It makes not the leaſt effervefcence with Acids, and in burning acquires a darker colour with little or no additional hardneſs, but in a great fire is converted into a deep green clear glaſs.

It is dug in great abundance in the north eaſt parts of Armenia, where it never lies very deep, and often appears on the ſurface: The ſtrata of it are often ſix, ſeven, or eight foot thick, and the Bole is always of the deepeſt colour at the bottom, and paler toward the top, tho' never degenerating into white or yellow, but conſtantly keeping its ſaffron colour in different degrees to the very top.

It is a very excellent Aſtringent, and has been ever accounted good in the plague, malignant fevers, dyſenteries, ſpitting of blood and Hæmorrhages of all kinds, but it is ſeldom or never to be found genuine in our ſhops.

I have already obſerv'd, that not this, but the yellow Bole of Armenia, was the true Armenian Bole of Galen, for that author firſt brought it into uſe among the phyſicians, and made it known to the world as a medicine. It has indeed been ſuppos'd by ſome eminent critics, That Dioſcorides, tho' he knew no other Earth under the name ἀρμένιον, but the Lapis Armenus us'd as a blue in painting; yet was acquainted with an Armenian Bole, tho' not under that name: This they infer from his having mentioned two kinds of Orpiment, one of which they are willing to imagine was this Armenian Earth; but Reaſon will teach us to diſſent from them in this particular; and ſurely it cannot be poſſible on a ſtrict examination of that whole ſentence, to think that the Author cou'd have had any ſubſtance of this kind in his eye. After having given an excellent deſcription of Orpiment, and one that ſhews he was well acquainted with that Foſſil in all its purity; he adds, that there are properly two kinds of it, one the pure one he had juſt before deſcrib'd, and the other form'd into irregular glebes, in figure reſembling the lumps of Ochre, and in colour approaching to Sandarach, his words are, ἐϛὶ δ' ἀυτȣ εἴδη δύο τὸ μὲν ὅιον ϖροείρηται, τὸ δὲ βωλῶδες τῆ χρόα σανδαραχίζον. If it were poſſible indeed to conceive Dioſcorides here meant any Bole Armenic at all, one wou'd be ready to acknowledge the red one, deſcrib'd in this chapter to have been the ſubſtance; for it is evident what is truly the Armenian Bole of the antients, cou'd have no title to the τῆ χρόα σανδαραχίζον of this Sentence: but ſurely it is impoſſible to be the caſe, that an author who had juſt before given ſo excellent a deſcription of Orpiment, and prov'd he ſo well knew the nature of that body, ſhou'd think a pure genuine Earth a kind of it; and indeed, if we look a little farther into the text, we ſhall find yet more reaſon to conclude he cou'd mean no ſuch ſubſtance, for he ſums up his account of Orpiments without excluding this kind, by ſaying they wou'd take fire in burning, and even flame; things equally certain in Orpiments, and impoſſible in Earths; and that they were Corroſive, Styptic and Eſcharotic. I need not ſay, that it was impoſſible ſo accurate a judge as Dioſcorides, cou'd ſuppoſe a ſimple Earth cou'd poſſeſs theſe qualities, or add that, ſince it is evident that he no where, except it be in this place, mentions the Armenian Bole of later ages, it is evident he knew it not.

Notwithſtanding, however, that the true Armenian Bole was never written of till the time of Galen, the Earth deſcribed in this chapter, and which we have erroneouſly ſince learned to call Armenian Bole, it is evident was known much earlier, even in the Days of Theophraſtus; but that not as a medicine, or under the name of Bole Armenic, but as a thing uſeful to mechanics, and called the Lemnian Reddle μίλτος λημνία, a ſubſtance known to all the old authors, but carefully diſtinguiſhed by them from the Lemnian Earth, the Γῆ λημνία as that was call'd by way of diſtinction, and never us'd in medicine. The true hiſtory of Bole Armenic therefore appears to be this, that Galen found it a yellow Earth, and introduced it with great ſucceſs into the practice of phyſic, and was for ſome time regularly followed in it; for Myrepſus frequently mentions Bole Armenic, and always deſcribes it as being yellow; but in after ages the new medicine became loſt, and this red Armenian Earth now deſcrib'd, and which had formerly been known by the name of Rubrica Lemnia, was ſubſtituted in its place till the knowledge of the true medicine was wholly loſt, and authors at length deſcrib'd this as the true Armenian Bole; for it is evident that Avicenna knew no other; that Actuarius makes what he calls Bole Armenic of the ſame colour with the Lemnian Seal'd Earth, tho' that indeed was a yet greater error; and that the Arabians in general acknowledged this as the genuine. Whatever ſhare the miſtaking the words of Dioſcorides before mentioned might have in the eſtabliſhing this error, it evidently appears, that no fault of that author, but the careleſſneſs and inattention of his readers alone are to be blamed for it; the ſubſtance he deſcribes as a ſecond kind of Orpiment was ſo far from being an Earth, that it evidently was what he eſteem'd it, a ſpecies of that body, a coarſe native Sandarach, which I flatter myſelf that I am ſo happy to have by me, and which cannot but be at times found among the Orpiments.

But, if we are ready to pity the antients for the loſs of ſo valuable a medicine as Galen's Bole, how much more ought we in this caſe to pity ourſelves; they had in the place of it a very good medicine, perhaps little inferior to the genuine drug itſelf, while we uſe inſtead of it a villainous compoſition, made of no better materials than tobacco-pipe clay, and an ochre known by the painters under the name of Spaniſh brown.

If any thing I cou'd ſay might be of force enough to ſpirit up the gentlemen of my own profeſſion to ſeek after a medicine ſo eaſily had, and of which thoſe who have try'd it record ſuch excellent virtues, and no longer to uſe ſo inefficacious a mixture in its place, I ſhould think myſelf very happy in having been the means of ſo much good to the world.

2. *Bolus ponderoſa denſa pallide rubeſcens, quæ Bolus Rubra Gallica Officinarum.*

Heavy, compact, pale red Bole, called Red French Bole.

This is the Bolus ruba noſtras, Ind. Med. 21. Dale Pharm. 18.

It is an irregular Earth, conſiderably weighty, of a denſe but unequal texture, compact in ſome parts, and looſe in others; and in colour of a pale red, but vein'd and ſpotted with a pale yellowiſh white Earth, of a much looſer texture than the reſt of the maſs, and approaching in ſome degree to the nature of the Marles. It is of a ſmooth ſhining ſurface, eaſily breaking or crumbling between the fingers, and not ſtaining the hands; it melts eaſily in the mouth, but leaves a grittyneſs between the teeth, and is readily diffuſible in water.

Before the Microſope, it appears of a moſt irregular and unequal texture, of a duſty ſurface, and vein'd with a multitude of lines of the pale Earth, too ſmall to be diſcover'd by the naked eye.

It makes a very ſlight effervеſcence with Aqua Fortis, and in a moderate fire burns to a ſomething redder colour, but with very little additional hardneſs; in a violent one, it is converted into a pale blue glaſs.

It is dug in many parts of France, particularly in the neighbourhood of Paris. It is a very good Aſtringent, and is in conſtant uſe in that kingdom, having, like our adulterated kind, by its cheapneſs wholly excluded the uſe of the Oriental Boles. The Bole of Blois before deſcrib'd, is a thing ſometimes talk'd of in our ſhops, but if any body enquires for it, this is generally ſold in its place, and even this too often adulterated.

3. *Bolus friabilis levis ſordide rubeſcens, quæ Terra Strigonienſis Sigillata authorum.*

Light, friable, dull red Bole, call'd Seal'd Earth of Striga.

This is the Terra Sigillata Strigoniana, Charlt. Foſſ. 6. Terra Sigillata Strigonienſis Schwenk. 395.

It is but a coarſe and impure Bole, lighter than the generality of theſe Earths, and of a ſomewhat looſe texture: It is of a ſtrong but dull red, of a tolerably ſmooth ſurface, but not gloſſy; apt to crumble between the fingers, and in ſome degree ſtaining the hands; it readily diffuſes, in water, and eaſily melts in the mouth with a great ſmoothneſs, but very little Aſtringency in its taſte, and leaves a ſenſible grittyneſs between the teeth. It is an Earth upon the whole that degenerates ſo far in two or three particulars from the character of this claſs, that were there any other it could at all properly belong to, it would not have been allow'd a place here.

It appears before the Microſcope of a looſe ſpungy texture, and vein'd and ſpotted with a whiter Earth like the French Bole.

It makes a very ſlight effervеſcence with Aqua Fortis, and in the fire gets a very conſiderable additional hardneſs without any change of colour; a very violent one converts it into a looſe, ſpungy, greeniſh, half vitrify'd maſs.

It is brought from the ſame place with yellow Bole of this name, but the great difference between them is, that this forms of itſelf a ſtratum at the bottom of a hill, whereas that is found in the perpendicular fiſſures of the ſolid ſtrata.

It is accounted an Aſtringent, and a good medicine in malignant fevers, but is much inferior to the yellow kind.

4. *Bolus friabilis ponderoſa rubra, quæ Terra Sigillata Livonica authorum.*
Heavy, friable, red Bole, call'd Seal'd Earth of Livonia.

This is the Terra Sigillata Livonica Worm. Muſ. 12. Charlt. Foſſ. 6.

It is an impure but a very valuable Earth, conſiderably heavy, and of a ſomething paler colour than the red Sileſian Bole, of a looſe texture, but ſmooth and tolerably gloſſy ſurface, eaſily breaking between the fingers, and not at all ſtaining the hands, readily diffuſible in water, and melting freely in the mouth, with a ſtrongly aſtringent taſte, but not without ſome grittyneſs between the teeth.

The Microſcope ſhews it to be of a looſe texture, compoſed of thin ſtrata like ſome of the other Boles, and ſpangled with a ſmall quantity of a yellowiſh ſand.

It makes no effervеſcence with acids, and in a common fire ſuffers very little change either in colour or texture, but in a violent one becomes a green but very coarſe glaſs.

It is dug out of the ſame pit with the yellow Bole of the ſame place, and conſtitutes a ſtratum under it, but ſeparated from it by one of a ſoft bluiſh clay.

It is a powerful Aſtringent, and is preſcrib'd with ſucceſs in Diarrhœas, Dyſenteries, and other diſtempers of a like kind.

This ſpecies of Earth is produc'd alſo very plentifully in Penſylvania, from whence it has been ſent over by the indefatigable John Bartram.

5. *Bolus ponderoſa friabilis, pallide rubeſcens, quæ Terra Sigillata rubra Magni Ducis authorum.*
Heavy, friable, pale red Bole, call'd red Seal'd Earth of Tuſcany.

This is the Terra Sigillata rubra Magni Ducis. Mont. Exot. 13. Dale Pharm. 17.

It is a very valuable but impure Bole, very weighty, of a regular but not compact texture, and of a pale red colour; it is of a ſmooth but not gloſſy ſurface, eaſily breaking between the fingers, and apt to ſtain the hands; if apply'd to the tongue it adheres ſtrongly to it; it melts readily in the mouth, and affords a fine ſmooth ſubſtance with a ſtrong aſtringency, but is debas'd by an admixture of hard particles that grit between the teeth.

The Microſcope ſhews it to be of that laminated texture deſcrib'd before in ſome other of the Boles, and to contain a ſmall quantity of a very fine white ſand.

It makes no effervеſcence with Aqua Fortis, and in burning acquires a very conſiderable hardneſs, and a ſomething darker colour; in a violent fire it affords a looſe ſpungy greeniſh glaſs.

It is dug about eight miles to the eaſtward of Florence, but in no great plenty, and is preſcrib'd in Italy in fevers of all kinds, and in Diarrahœas, Dyſenteries and Hæmorrhages with great ſucceſs.

6. *Bolus floride rubra ponderoſa friabilis, quæ Terra Portugallica Officinarum.*

Friable, weighty, fine red Bole.

This is the Terra Portugallica, Dale. Ph. 19.

It is a very fine and valuable Earth, but not perfectly pure. It is of a cloſe, compact, and regular texture; conſiderably weighty, and of a fine florid red; of a ſmooth, polite, and ſomewhat ſhining ſurface, readily diffuſible in water, eaſily breaking between the fingers, and a little ſtaining the hands; it melts readily in the mouth, adheres firmly to the tongue, and has a manifeſt aſtringency in the taſte, but leaves a little grittyneſs between the teeth.

The Microſcope ſhews it to be of a regular but ſomewhat rough and crumbly texture.

It makes no effervescence with Aqua Fortis, and in burning acquires a little additional hardneſs, without change of colour, but in a great fire is converted into a pale blue glaſs.

It is dug in great plenty in the northern parts of Portugal, and eſteem'd a remedy againſt poiſons, venomous bites, and malignant fevers: it is manifeſtly an Aſtringent of the firſt claſs.

7. *Bolus ponderoſa dura pallide rubeſcens, quæ Terra Lemnia rubra authorum.*

Hard, weighty, pale red Bole, call'd Red Lemnian Earth.

This is the Terra Lemnia. Aldr. Muſ. Met. 262. Terra Lemnia rubra. Worm. 10. Charlt. Foſſ. 5. Lemnia Terra Matthiol. 1360. Terra Lemnia vel Sigillata vera Kentm. 3. Lemnia Terra Dougl. Ind. 32.

It is a very aſtringent and fine Earth, but not perfectly pure, for when we meet with any that is ſo, it is ſuch as has been waſh'd and manufactur'd either on the ſpot, or ſince it was brought over; the Earths in general that are imported to us ſeal'd, are liable to a multitude of adulterations, and none of them more ſo than this, which is ſo often counterfeited and ſophiſticated, both here and where it is dug, that few people, unleſs thoſe that have been upon the ſpot, have ever been able to diſtinguiſh the true.

It is a denſe, ponderous Earth, of a cloſe, compact, regular texture, and pale red colour; of a very ſmooth, and even ſurface, but not gloſſy or polite; not readily breaking between the fingers, not at all ſtaining the hands, nor very readily diffuſible in water; it melts ſlowly in the mouth, and has a fine aſtringency in its taſte, but leaves ſome grittyneſs between the teeth, and if apply'd to the tongue in the lump, adheres ſtrongly to it.

The Microſcope ſhews it of a fine, equal and compact texture.

It raiſes a ſlight effervescence with Aqua Fortis.

In the fire it acquires a conſiderable hardneſs, without much change of colour; and in a more violent one it affords a very fair deep green glaſs.

It is dug in the iſland of Lemnos, and no other place that we know of, and the fine and true Earth only in one pit, in which it conſtitutes the lower ſtratum, and the yellow before deſcrib'd that next above it: This pit is open'd only once every year, and the Earth ſuppos'd ſufficient for the years demand taken out at that time with great ſolemnity, and ſold partly ſeal'd, and partly unſeal'd, to the merchants; but the form of a ſeal'd Earth being always expected with it, the perſons who buy it rough, generally procure it to be ſeal'd afterwards, before they offer it to ſale; that ſeal'd upon the ſpot, has generally Arabick characters upon it, the other often a creſcent and three ſtars, the inſcription Terra Lemnia, and under it two palm branches; and this I have more frequently met with genuine than even that ſeal'd in the country, for the Turks have a thouſand ways of adulterating it; and indeed too often ſell in its place the common Earth of a neighbouring hill, which Galen, and ſince his time Bellonius and others have mention'd in the eaſtern parts of the iſland; and which, as they have very juſtly obſerv'd, produces neither tree nor plant, nor affords ſo much as a ſtone, but is intirely made up of a deep yellowiſh red Earth, which has been taken indeed by many to be the true medicinal red Earth of Lemnos; but erroneouſly, for it is of a deeper colour, more impure, and is in reality no other than a coarſe kind of the Lemnian Reddle, or *μίλτος λημνία*, as it was antiently call'd, and in ſome parts of it affords that ſubſtance pure and clean; which is, as I have before obſerved, now commonly called the true Bole Armenic. This is what I have been able to collect from the mouths of thoſe who have been upon the ſpot; and from experiments made on the things themſelves: For the Earth of this hill ferments not in the leaſt with Acids, in which it agrees with our Bole Armenic, or the Lemnian Reddle of the antients; and like it acquires a darker colour in burning.

The ſettling this point is a thing of the more conſequence, as the antients themſelves have left it in ſome confuſion. Pliny abſolutely confounds the two Earths of Lemnos, for after he has very well deſcribed the Reddle, he ſays, it was never ſold till firſt ſeal'd, nec niſi ſigillata venundabatur, where he evidently miſtakes it for the other: And Galen, tho' he well knew there were theſe two different Earths in Lemnos, yet has not quite ſo accurately diſtinguiſh'd them as might have been wiſh'd: For tho' in one place he ſays, there are three kinds of the Earth; one which the prieſts only might touch; and another which was a true Reddle, and us'd by artificers; and a third about the cleaning of cloths; yet he ſets out with telling us, that the Lemnian earth was called by ſome Reddle, *μιλτος*, and was ſeal'd by the prieſts; which ſeems too plainly to imply, that the Reddle was ſeal'd: And afterwards, when he has deſcribed the ſealing of it adds, that ſome called it *λημνια σφραγις* the Lemnian ſeal'd Earth; and others, *μιλτος λημνια*, or Lemnian Reddle, and that there was a hill of it in the iſland, as before deſcribed; this hill, as I have already obſerv'd, in reality is not of the Lemnian medicinal Earth of the ancients, but of their Reddle, or our Bole Armenic. Dioſcorides, however, was not guilty of this error, he never mentions the hill as affording the medicinal earth; but ſays very juſtly, that it was taken, as it is to this day, out of a hollow'd ſubterranean cavern.

It is not only an excellent Aſtringent, and good in Diarrhœas, Dyſenteries, and Hæmorrhages, but alſo an admirable Diaphoretic, and uſeful in malignant fevers. I am ſenſible that I ſhall fall under the imputation of too much credulity, and perhaps want of judgment, in this and the like accounts of the virtues of ſome other of the Boles, with thoſe who have fallen into the too generally eſtabliſh'd opinion, that they are all mere dead Earths, and endued with no other quality but that of abſorbents; but I muſt take the liberty on this occaſion to obſerve, that it is never well to judge too haſtily; and that if theſe Gentlemen would have been at the pains of analyſing theſe Earths firſt, they would not ſo abſolutely have condemned them afterwards, nor have doubted that an Earth might poſſibly have the virtues I have attributed to theſe, when they found that it afforded, as this and many others of the Boles do, a volatile urinous ſalt, of the Sal Armoniac kind; a fix'd ſalt approaching to the nature of Sal Gemm, and a ſtrong ſcented bituminous oil.

Many of the Oriental Earths, and ſome of the German, contain theſe principles; the yellow, or true Bole Armenic affords them in the greateſt degree, this is the next to that; the yellow Lemnian Earth comes after this, and the Bolus aurea friabilis, is that of the German ones, which moſt of all comes up to theſe.

I am aware, that nothing is more difficult than to ſpeak with perfect juſtice and exactneſs of the virtues of ſimple medicines: The antients in general have believ'd too much of them; and at preſent 'tis the faſhion to allow them too little; the juſt mean between the two extreams is hard to be obſerved, and perſonal experience can never ſhew one man all. What will be endeavour'd in this work, which I wou'd fain make as generally uſeful as may be, will be to ſpeak as much as poſſible on perſonal knowledge, to learn as much as may be from the experience of others, and to give credit to the accounts of the antients, ſo far only as their own experience ſeems to have been the foundation of what they affirm, or the original ſtructure and principles of the body, will give ſome probability of its being poſſeſs'd of the virtues they aſcribe to it.

8. *Bolus friabilis grizeo rubeſcens, quæ Terra ſigillata Turcica authorum.*
Friable, greyiſh red Bole, called Turky Earth.

This is the Terra Sigillata Turcica Schrod. 317. Paſtilli Turcicis Characteris Inſigniti Worm. 11.

It is a fine and valuable Earth, but not perfectly pure; it is of leſs cloſe or compact texture than many of the other Boles, yet conſiderably heavy; of a greyiſh red in colour, and always redder on the ſurface than within: It is externally ſoft, ſmooth and polite, breaks eaſily between the fingers, is very readily diffuſible in water, and melts readily in the mouth, leaving a manifeſt aſtringency there; and ſome little harſhneſs between the teeth; apply'd to the tongue, it ſticks to it but little.

Before the Microſcope it appears of a looſe ſpungy texture.

It raiſes no effervefcence with Aqua Fortis.

It burns to a conſiderable hardneſs; and what is very remarkable, to a duſky yellow colour: In a violent fire it affords a very pale whitiſh blue glaſs.

It is dug in great plenty in the neighbourhood of Adrianople, and us'd by the Turks as a Sudorific and Aſtringent, and is famous among them in peſtilential diſeaſes.

9. *Bolus durior pallide & elegantiſſime rubeſcens.*
Hard, pale red Bole.

This is a pure and fine Earth, moderately heavy, of a firm and ſeemingly compact texture, and remarkable hardneſs, of a moſt beautiful pale red, ſomething like what we call fleſh colour, but too red and too bright to be exactly what we mean by that expreſſion, and ſometimes ſtain'd with yellowiſh veins, of a perfectly ſmooth and gloſſy ſurface, not eaſily broken between the fingers, nor at all ſtaining the hands: It adheres very firmly to the tongue, is eaſily diffuſible in water, and melts readily in the mouth, is of a very rough aſtringent taſte, and perfectly pure, leaving not the leaſt grittyneſs between the teeth.

View'd thro' the Microſcope, it appears of a rough unequal ſtructure, porous in ſome degree, and full of ſmall white ſpecks.

It makes no effervefcence with Aqua Fortis.

In the fire it burns to an abſolutely ſtony hardneſs, and a darker and ſomewhat blueiſh colour: In a violent fire it yields a coarſe greeniſh glaſs.

It has been found in many parts of America. I have received it thence from Dr. Mitchell, of his own collecting; and from Mr. Peter Collinſon, to whom it was ſent by John Bartram. It ſeems indeed to be the product of moſt parts of America, for Dr. Mitchell informs me, That it is common in Penſylvania and Virginia: And Dr. Woodward mentions an Earth, Vol. 2. P. 2. of foreign Foſſils, ſeemingly the ſame with this which he received from Carolina.

It has never been us'd in medicine, but ſeems much to deſerve it. As it may be had extremely cheap, it wou'd be worth importing to uſe here, inſtead of the miſerable cheats common with us under the name of Bole Armenic.

SECT. IV. The Brown BOLES.

1. *Bolus puriſſima fuſca dura.*
Pure, pale brown, hard Bole.

THIS is a perfectly pure and fine Earth, of a very compact texture, and moderately heavy, it is of a very beautiful brown, equally colour'd thro' the whole maſs, and of a moſt regular fine texture, but compos'd of a number of thin Lamina, laid cloſely on one another; of a ſmooth, polite and ſhining ſurface, very ſmooth to the touch, not breaking eaſily between the fingers, nor at all ſtaining the hands; it adheres but ſlightly to the tongue, and melts very freely in the mouth, and reſembles the yellow Bole of Armenia in taſte and fineneſs, not leaving the ſlighteſt grittyneſs between the teeth. Thrown into water, it after a few moments falls into a looſe maſs of flaky lumps.

View'd by the Microſcope it appears of a fine even texture, and compos'd of a number of thin plates or Lamina, laid cloſely on one another.

It makes no effervefcence with Aqua Fortis.

In the fire it cracks and burſts, flying off in ſmall flakes at the diviſion of the Lamina, but burns afterwards to a very conſiderable hardneſs, and pale red colour. Urg'd by a very violent fire it is converted into a pale green glaſs.

It is dug in the Hartz-foreſt in Germany, in the mines at Goſſelaer, in many parts of the German dominions, in America, and in ſome parts of England. The Engliſh is generally ſomething darker colour'd than the German. I have obſerv'd of it about Birmingham and near Oxford, at which laſt place it alſo ſometimes loſes the laminated texture, but anſwers to all the characters of the ſame Earth; and the ſame Variation I have ſometimes ſeen alſo among the German.

It is a very powerful Aſtringent: the Germans uſe it alſo in fevers, and for the bites of venomous animals.

2. *Bolus pallide fuſca ponderoſa denſa.*
Pale, brown, denſe, heavy Bole.

This is a very compact, denſe and firm Earth, conſiderable heavy, and in colour of a pale brown, ſpotted with ſmall ſpecks of white and yellow, of about the bigneſs of ſmall pins heads. It is of an unequal irregular texture, and naturally of a ſomewhat rough ſurface; tho' on rubbing it will ſhine and acquire a kind of poliſh; it adheres ſcarce at all to the tongue, is very remarkably ſmooth and unctuous to the touch, is not to be broken between the fingers, nor at all ſtains the hands. It melts pretty freely in the mouth, but is of a diſagreeable taſte, with the unctuous ſmoothneſs of our common fullers earth upon the tongue, but is very pure, leaving not the leaſt grittyneſs between the teeth; thrown into water, it after a few moments falls into an extremely fine, pale, yellowiſh brown powder.

View'd by the Microſcope it makes a very remarkable figure, appearing a cloſe pale brown clay full of fine ſhining white lumps, with ſome few a little yellowiſh among them, ſo exactly in ſhape, ſize, and colour, reſembling grains of ſand, that it is impoſſible for the ſight to diſtinguiſh them from ſuch. When taſted, however, theſe all melt without the leaſt harſhneſs in the mouth, and prove to be in reality fragments of an indurated clay of the nature of the Morochthus or Steatites.

It makes no efferveſcence with Aqua Fortis.

It burns to a duſky red, with very little additional hardneſs; and in a great fire runs into a pale blue glaſs.

It is dug in many parts of Germany. And us'd as a Sudorific and Aſtringent, tho' to me it ſeems to poſſeſs the latter of thoſe qualities but in a very remiſs degree.

3. *Bolus fuſca friabilis levis.*
Light, friable, brown Bole.

This is a perfectly pure and fine Earth, of a leſs cloſe or compact texture than moſt of the other Boles, and leſs weighty; it is of a pale brown, but frequently not uniformly ſo, but tending to a duſky reddiſhneſs in ſome parts, and to a faint reſemblance of ſomething like yellowiſhneſs in others; it is of a ſmooth, equal, and polite ſurface, eaſily crumbling between the fingers, and not at all ſtaining the hands. It adheres firmly to the tongue, is readily diffuſible in water, melts quickly in the mouth, has but a moderate degree of aſtringency to the taſte, and leaves not the leaſt harſhneſs between the teeth.

Before the Microſcope it appears of a regular but ſomewhat coarſe texture, and frequently diſcovers ſpecks of black, not viſible to the naked eye.

It makes no efferveſcence with Acids.

In a moderate fire it burns to a very conſiderable hardneſs, and dark duſky red colour. Urg'd by a more violent one, it is converted into a blue ſpungy and coarſe glaſs.

It is found in many parts of this kingdom; it is very common about mount Sorrell in Leiceſterſhire. I remember alſo to have ſeen it near Sherborn in Dorſetſhire, and in the neighbourhood of Bedford, and have been inform'd that it is common in the Weſt Indies.

It has not been yet try'd in medicine, but ſeems to be a very valuable Aſtringent.

SECT. V. The Green BOLE.

Bolus puriſſima vireſcens.
Pure greeniſh Bole.

THIS is a perfectly fine and very beautiful Earth, conſiderably ponderous, of a cloſe, compact, and extremely even texture, of a pale duſky greeniſh colour, but often acquiring a brown cruſt, and of perfectly ſmooth and even, but not gloſſy ſurface. It does not eaſily break between the fingers, nor at all ſtain the hands; it adheres firmly to the tongue, is readily diffuſible in water, melts eaſily in the mouth, and is of a brackiſh and very diſagreeable taſte, without any conſiderable aſtringency, but leaves not the leaſt grittyneſs between the teeth.

View'd thro' the Microſcope it appears of a moſt compact, fine and regular texture.

It makes no efferveſcence with Acids.

In burning it acquires a conſiderable hardneſs, and a duſky browniſh red colour. Urg'd by a very violent heat it is converted into a pale green glaſs, with ſome tinge of redneſs.

It is found in the perpendicular fiſſures of ſtrata of ſtone, in Yorkſhire, Devonſhire and Cornwal.

It has not yet been try'd in medicine, nor indeed does it ſeem proper for internal uſe, ſince it manifeſtly owes its colour to particles of copper.

SERIES I.

CLASS I. ORDER I. GENUS II.

CLAYS.

EARTHS firmly coherent, weighty and compact; ſtiff, viſcid, and ductile to a great degree while moiſt; ſmooth to the touch, not eaſily breaking between the fingers, nor readily diffuſible in water, and when mixed, not readily ſubſiding from it.

SECT. I. The white and whitiſh CLAYS.

1. *Argilla albiſſima ponderoſa tenax. Quæ Parætonium Authorum.*
White, tough, heavy Clay. The Parætonium of authors.

This is the Parætonium Plin. L. 35. p. 684. Cæſalpin. 43. Aldrov. Muſ. Met. 250. Agricol. 202.

It is a very beautiful, and when pure a perfectly white Clay, very heavy, and of a cloſe compact, and very fine texture; when moiſt it is extreamly ductile, ſtiff, tough and viſcid, and when cut, leaves a moſt polite and ſhining ſurface; when dry it becomes moderately hard, of a ſmooth and even ſurface, except where made irregular by the extraneous bodies that are lodg'd in it; very ſoft and ſmooth to the touch, pretty eaſily breaking between the fingers, and not at all ſtaining the hands. It adheres very ſlightly to the tongue, and melts freely in the mouth into a ſubſtance like cream, but is generally full of accidental foulneſſes that leave a grittyneſs between the teeth, tho' naturally it ſeems to be perfectly pure.

When examin'd by the Miſcroſcope, if a clean pure piece is choſen, it appears of a moſt cloſe, even, and regular texture, and very firm; but in the maſs it diſcovers to this examination and equally to the naked eye, a ſtrange mixture of adventitious particles of ſand, fragments of ſhells, &c.

It makes a very briſk efferveſcence with Aqua Fortis.

It burſts and crackles in the fire, but burns to a ſnow white colour, with ſome additional hardneſs. In a very violent fire it is converted into a pure and very deep green glaſs.

This Earth was antiently found on the ſhores of Egypt, Cyrene, and the iſland of Crete, and had its name either from a port of Egypt, near which it was gather'd, according to ſome; or as others rather think, from the name of a town in that kingdom where it was uſually ſold. Pliny affirms its having its name from Egypt; and Vitruvius will have it to be from the Port which lay againſt Cyrene; and Volaterranus from a city of that name. It is at preſent common on the ſhores of moſt of the iſlands of the Archipelago, tho' not obſerved or regarded. It is found in maſſes of different ſizes, generally as ſoft as the ſofter Clays, while in the ſtrata; and by rolling about on the beech in this ſtate, it gathers up ſand, ſmall ſhells, and other extraneous bodies, of which it is always full, and to the ſea water it thus imbibes, it certainly owes the ſaltneſs of its taſte, which I therefore avoided mentioning in the deſcription, as moſt probably an accident, and no inherent property in the body.

The ancients, and ſome authors ſince their time, have had many different opinions in regard to the origin of this ſubſtance: Pliny imagin'd it the froth of the ſea, coaleſced into a ſolid maſs, with the addition of ſome mud; and mentions this as the general opinion of his time, *Spumam maris eſſe dicunt ſolidatam cum Limo.* Aldrovandus thought it form'd of the diſunited particles of what he calls the fatter ſtones, ſuch as the lime ſtones waſh'd from them by the motion of the water, and afterwards got together in this form; and Daleſchamp, who has come neareſt the truth of any, eſteem'd it a Chalk produced about the ſhores, a Creta litoralis, which he adds was very white, fat, and glutinous, and could not be dug up without taking ſome of the mud of the ſhores along with it. It is very clear, however, that according to this very account, the ſubſtance could be no chalk; viſcidity and fatneſs, are qualities that cannot belong to an Earth of that claſs, neither are we indeed to imagine it was ever dug up from the flat parts of the ſhores; ſince if there was there a ſtratum of it, tho' ever ſo thin an one, it might certainly have been taken up pure from it. Upon the whole it appears moſt probable, that there are ſtrata of this Earth fine and pure in the clifts thereabouts, that the ſea in ſtorms and high tides waſhes off fragments of them, and that theſe are afterwards toſs'd about on the ſhores, and there acquire the ſhells, &c. of which they are always full.

It was much eſteem'd in painting among the ancients, but now is entirely unknown. Tho' it might eaſily be had, and readily parts with all its foulneſs in waſhing.

2. *Argilla leviſſima alba friabilis.*
Light, friable, white Clay.

This is a fine and very beautiful Clay, of a pure ſnow white, and never contracting a yellowneſs from the air, as the other white Clays are apt to do on their ſurface. It is of a ſoft friable texture, and the lighteſt of all the known Clays, dry and not ductile while in the ſtratum in any thing near the degree of the others, of a ſmooth ſurface, very ſoft to the touch, and ſtains the fingers in handling; it very ſlowly diffuſes itſelf in water, and does not melt in the mouth till after it has been held there ſome time, and then but very imperfectly and diſagreeably; it adheres pretty firmly to the tongue, and leaves a harſh grittyneſs between the teeth.

Examin'd by the Microſcope it appears of a moſt compact, cloſe and regular texture.

It makes no efferveſcence with Aqua Fortis.

In the fire it burns to ſome but not much additional hardneſs, without any change of colour; but in a very violent one affords a pale ſea green glaſs.

It is dug in the Iſle of Wight, and is much us'd for making tobacco pipes, tho' it will not ſerve that purpoſe alone, but muſt be mix'd with another coarſer Earth, next to be deſcribed, which is common in the ſame place, and in many other parts of England, this fine Earth alone not having a due tenacity. It is ſaid to be alſo a good medicine in fevers.

3. *Argilla ponderoſa alba dura.*
Hard, heavy, white Clay.

This is the Cimolia alba of the ſhops, the Argilla alba Charlt. Foſ. 1. and the Terra Candida Saponaria ſive Fullonica, Kentm. 1.

It is a denſe, compact, heavy Earth, of a dull white colour, and cloſe texture, hard, dryiſh, and not ſo ductile while in the ſtratum as moſt of the other Clays; of a tolerably ſmooth ſurface, not eaſily breaking between the fingers, and ſlightly ſtaining the hands; it adheres pretty firmly to the tongue, melts very ſlowly in the mouth, and is not readily diffuſible in water; it has a ſoft ſmoothneſs in the mouth, and leaves but little grittyneſs between the teeth.

Examin'd by the Microſcope, it appears of a very cloſe, compact texture.

It makes no effervеſcence with acids, and burns to a very white colour, and great hardneſs; in a violent fire it affords a deep green but commonly very foul glaſs.

It is dug in the Iſle of Wight, near Pole in Dorſetſhire, near Weddenſbury in Staffordſhire, and in many other parts of the kingdom.

It is in common uſe for making tobacco-pipes.

4. *Argilla grizeo alba ponderoſa dura.*
Hard, heavy, greyiſh white Clay.

This is a fine and very pure Earth, very ponderous, and of a cloſe, compact, firm texture, and greyiſh white colour; while in the ſtratum it is remarkably dry, ſtiff, and hard; when dry'd, 'tis of an even and gloſſy ſurface, ſmooth and ſoft to the touch, not eaſily breaking between the fingers, and ſcarce at all ſtaining the hands; apply'd to the tongue, it adheres very firmly to it, it melts ſlowly in water, and in ſome time diſſolves to a pulpy ſoftneſs in the mouth, leaving not the leaſt harſhneſs between the teeth.

Examin'd by the Microſcope, it appears of a very compact, equal, and regular texture.

It makes no effervеſcence with Aqua Fortis.

It burns to a perfect white, and a great hardneſs, and in a great fire affords a deep green glaſs.

It is dug near the town of Northampton, and in many parts of Staffordſhire, Devonſhire and Shropſhire.

It is the beſt of all the tobacco-pipe Clays, and beſides this uſe, ſerves, when diluted with water, to make the blue ſlip as it is call'd, with which the potters waſh over their earthen ware; this when waſh'd over alone, becomes either white, or yellowiſh after baking, and ſerves them for the ground of their other colours; and when mixed with the proper ingredients, makes moſt of the fine dark brown colour of our earthen ware.

5. *Argilla alba tenax.*
White, tough Clay.

This is a very firm and ſtiff Clay, conſiderably heavy, and of a cloſe compact texture; while in the ſtratum it is naturally of a pure white, but frequently ſpotted with ſmall ſpecks of a yellow Clay; it is extreamly tough and viſcid, and cuts with a ſmooth ſhining ſurface; in drying it becomes of a more duſky white, and acquires a very conſiderable hardneſs; it does not eaſily break between the fingers, nor at all ſtain the hands; has a ſmooth and even but not gloſſy ſurface, does not all adhere to the tongue, and is very difficultly diffuſible in water.

Examin'd by the taſte, or broken in water with a knife upon a marble; it appears to be a very viſcous Clay, with a ſmall quantity of hard particles intermix'd.

View'd thro' the Microſcope, its texture appears rough and unequal, and the hard particles are ſeen to be a large and ſomewhat coarſe white ſand.

It makes no effervеſcence with acids, and in the fire burns to a yellowiſh grey, without the leaſt tendency to redneſs, but urg'd by a very violent one, affords a fine ſtrong, but not very deep green glaſs.

It is dug in many parts of the kingdom: I remember to have ſeen of it in Norfolk, in Buckinghamſhire, in Northamptonſhire, and about London; there is a very thick ſtratum of it in the great Clay pit behind St. George's Hoſpital, at Hyde-Park-Corner.

It makes an excellent brick of a very remarkable ſtrength and hardneſs, and of a pale grey; but like all the other fine Clays, it requires three times the working that the loams ordinarily us'd in brick-making do; and if made into bricks without this expence, always cracks and ſhrinks in the drying ſo as not to be ſaleable; for this reaſon, notwithſtanding the excellency of the brick to be made from it, 'tis ſeldom work'd: The owner of the great pit juſt mention'd, is trying it with a mixture of aſhes, dirt from the ſtreets, and ſome of the ſandy loams of another part of the pit, for common brick-work, and may poſſibly ſucceed; but I am apt to believe that it is capable of a much better uſe, and that with ſufficient working, it would make the ſmall bricks commonly call'd clinkers, and us'd for the floors of ovens, pavements of ſtables, &c. as it is abſolutely the ſame Earth they are made of in other places; as the price of theſe is very conſiderable, 'twould certainly be worth his while at leaſt to try.

6. *Argilla albo-cinerea lævis.*
Smooth, greyiſh white Clay.

This is a very hard and dry Clay, of a cloſe, compact and fine texture, and great weight; while in the ſtratum, it is of a pale grey, hard, dry, not at all tough or viſcid, but breaking away into ſeparate clods and lumps in the digging; when dry, it becomes of a paler and whiter colour, of a hard firm texture, and a ſmooth and ſhining ſurface; it does not eaſily break, nor at all ſtain the fingers in handling; adheres but very ſlightly to the tongue, and to the taſte is very fine, ſmooth, and unctuous, but not without ſome grittyneſs between the teeth; it is, for an Earth of this genus, pretty readily diffuſible in water; and ſeparated by that means, depoſits a ſmall quantity of very fine but conſiderably hard matter.

Examin'd by the Microſcope, it appears to be a ſmooth Clay, of an equal and pretty fine texture, with a number of very ſmall, hard, and whitiſh ſhining particles; which on a ſtrict examination, are found not to be what they might moſt naturally be ſuppos'd, grains of ſand, but all regular, tho' very minute fragments of a ſpar, each of them being either a ſemipellucid, yellowiſh parallelipiped, or plated fragment of one.

This Clay, where ſmootheſt and freeſt from theſe particles, makes not the leaſt efferveſcence with acids, but where they are lodg'd in plenty in it, gives a ſlight and ſhort fermentation, which is an additional proof of their being not ſand, but a genuine ſpar; it burns to a very beautiful pale yellow with ſomething of a reddiſh caſt, and without any conſiderable additional hardneſs, and in a great fire affords a coarſe whitiſh green glaſs.

It lies generally pretty near the ſurface, and over other Clays: It is found in many parts of the kingdom; there is great plenty of it in the loam pits, at Hedgerley near Windſor; and I remember to have ſeen it about Stamford in Lincolnſhire; the workmen generally call it Golt; and wherever I have ſeen it, it has been eſteem'd of no uſe, nor ever work'd for any thing; but I am apt to believe from its texture, that it is not wholly without its uſe, but would make a coarſe earthen ware fit for garden pots and other ſuch veſſels, tho' perhaps it would not burn to any very conſiderable hardneſs, or take a glazing.

7. *Argilla cinerea ponderoſa.*
Heavy, grey Clay.

This is a hard brittle Clay, of a very fine and equal texture, and remarkable weight; while in the ſtratum it is of a duſky blueiſh colour, not viſcid or clinging together in ſoft maſſes in cutting, but dry, very hard, and breaking into thin flat pieces, as if compos'd of a number of diſtinct ſtrata; when dry, it is a firm, hard, and compact maſs, of a pale blueiſh aſh colour, and a ſmooth, ſoft, and ſhining ſurface; it adheres but very ſlightly to the tongue, is difficultly broke between the fingers, does not at all ſtain the hands, and is ſoft, fine and unctuous in the mouth, but leaves ſome hard tho' very ſmall particles, giving a grittyneſs between the teeth.

View'd by the Microſcope, it appears of a very fine and equal texture, and all over thick ſet with extreamly minute and flat particles, which are ſhining, white, and all compos'd of ſix ſides, and are evidently fragments of ſpar.

It efferveſces violently with Aqua Fortis.

In the fire it crackles, burſts, and flies into a number of thin flakes of an extreamly pale yellowiſh red; in a violent fire, it is converted into a whitiſh glaſs.

It is frequent in many parts of the kingdom, about Loughborough in Leiceſterſhire, and Aynho in Northamptonſhire there is great plenty of it.

It is not work'd for any uſe.

8. *Argilla albocinerea duriſſima Alkalina.*
Hard, grey Alkaline Clay.

This is an extreamly hard Clay, of a firm, ſtrong, compact texture, and moderately heavy; while in the ſtratum, it is of a pale greyiſh colour, and very hard; not cutting into ſmooth, even maſſes in digging, but breaking difficultly and irregularly; when dry, it becomes a maſs of an almoſt ſtony hardneſs, is a little paler in colour than while in the Earth, and of a ſomething rough and duſty ſurface, very difficultly breaking, and readily ſtaining the hands; it adheres firmly to the tongue; is not very readily diffuſible in water, and feels harſh and looſe in the mouth, with a little grittyneſs between the teeth.

View'd by the Microſcope, it appears a Clay of a moderately fine texture, with a quantity of ſmall white particles of irregular figures, and great hardneſs, and of the nature of the common white writing ſand.

It raiſes a violent effervеſcence with Aqua Fortis, and burns to a duſky browniſh colour without any additional hardneſs; in a violent fire it is converted into a light grey ſpungy maſs.

It is thrown up in ſeveral places about London in digging for tile Clay; it is very common in the pits near Tyburn, where it uſually lies at about ſeven foot deep under two ſtrata, one of vegetable mould, the other of gravel.

It is not likely to prove ſingly of any uſe in the potters trade, but ſeems worth enquiring into as a medicine from its highly Alkaline quality.

Many Earths might indeed ſeem poſſeſſed of this to an incurious obſerver, from an admixture of adventitious particles of a ſparry kind, as the two abovementioned; but thoſe are always to be diſtinguiſh'd from theſe, which are in themſelves truly Alkaline, by the partial and weak fermination they afford with Acids, and by the ſhape and ſtructure of the ſparry particles they contain, which are always diſcoverable by good glaſſes, and eaſily diſtinguiſh'd from genuine ſand.

9. *Argilla alkalina albocinerea mollis.*
Soft, grey, alkaline Clay.

This is a ſoft impure Clay, moderately heavy, and of a looſe texture. While in the ſtratum it is of a duſky grey, and generally more or leſs ſtreak'd and motled with a very pure yellow Clay: It is moderately coherent, and cuts regularly into maſſes, with ſmooth polite ſurfaces; when dry it becomes a little paler in colour; is of a ſomewhat looſe and crumbly texture, and rough ſurface: It adheres moderately to the tongue, is eaſily broken between the fingers, and does not at all ſtain the hands. It diffuſes difficultly in water, and depoſits a ſmall quantity of a fine pale yellow ſand, which gives it a harſhneſs when taken into the mouth.

Examin'd by the Microſcrope its textures appear very coarſe, the yellow ſpots and ſtreaks are plainly of the yellow Clay, hereafter to be deſcribed, N° 1. of the ſecond Section; and the ſand is all ſeen to be lodg'd in the maſs itſelf, and not in the yellow ſtreaks.

It raiſes a violent effervеſcence with Aqua Fortis.

It burns to a conſiderable hardneſs, and a fair reddiſh colour: In a violent fire it is converted into a pale blueiſh green glaſs.

I received it from Staffordſhire, where 'tis us'd, but not ſingly in the pottery: It is far from being peculiar to that county, many parts of the kingdom produce it, nor is it wanting even in the neighbourhood of London.

10. *Argilla ponderoſa cinera mollis.*
Soft, aſh coloured, heavy Clay.

This is a looſe Clay, of a coarſe irregular texture, and conſiderably weighty: While in the ſtratum, it is of a very deep dirty aſh colour, variegated commonly with an admixture of a coarſe and very deep yellow Clay: It is not very ſtiff or viſcid, yet cuts pretty evenly with the ſpade, and ſhews a ſmooth and equal ſurface; when dry it is of a ſomething paler colour, not very hard but of an irregular rough ſurface: It adheres a little to the tongue, eaſily breaks between the fingers, and does not at all ſtain the hands; it is more readily diffuſible in water than moſt other Clays, melts freely in the mouth, and leaves a conſiderable grittyneſs between the teeth, but the particles that occaſion it ſeem not large.

Examin'd by the Microſcope it appears a looſe Clay, containing a conſiderable quantity of a ſmall pale brown ſand.

It makes no effervefcence with Aqua Fortis.

In a moderate fire it acquires a reddiſh brown colour without much hardneſs: In a violent one it is converted into a coarſe green glaſs.

It is dug in Staffordſhire, and us'd there by the potters; and is alſo found in moſt other counties: This and the former earth, which are neither of them alone very fit for the potters uſe, are mix'd with ſome of the purer and ſtiffer Clays to be deſcribed hereafter, to break their texture, and make them eaſier to work for the coarſer veſſels.

11. *Argilla indurata albo-purpurea lævis, Steatites recentiorum, Cimolia purpuraſcens antiquorum.*

Smooth, purple, and white indurated Clay, the Steatites of the moderns, the purple Cimolia of the antients.

This is the Steatites Aldrov. Muſ. Met. 665. Steatites Wood, Vol. 1. P. 6. a 20, 21. And is evidently the Cimolia purpuraſcens of the antients.

This and the three following ſubſtances, tho' from their great hardneſs they might appear to ſome of a different claſs of Foſſils; yet upon a ſtrict examination, are found to have all the properties of a harder Clay, and are therefore ſtrictly and properly of this.

This ſpecies is a moſt elegant and valuable Earth, compos'd of extreamly fine particles, of a firm, equal and regular texture, and very great weight.

While in the ſtratum it is conſiderably hard, and will not be cut down evenly with the ſpade, as moſt of the Clays are, but breaks irregularly into lumps of different ſhape and ſize, and after it has been ſome time taken out, becomes yet much harder.

It is of a perfectly fine ſmooth and gloſſy ſurface, ſofter and ſmoother to the touch than any of the other Earths, and does not at all adhere to the tongue, or ſtain the fingers in handling, but drawn along woollen cloth, or any other rough ſubſtance, leaves a fine and clean white line: It is in colour white, beautifully vein'd with purple of different degrees of deepneſs; and of ſo fine a ſtructure of parts, That cut into thin pieces it is in ſome degree tranſparent. It is very difficulty diffuſible in water, and melts but ſlowly in the mouth, filling it with a ſmooth unctuous ſoftneſs, and not containing the leaſt hard particle, or leaving the ſlighteſt grittyneſs between the teeth.

Examin'd by the Microſcope it appears one regular and uniform maſs, a little more opake in the purple parts than in the white, and ſo perfectly equal in all its parts, that the beſt glaſſes can diſcover no blemiſh in its texture.

It raiſes no effervefcence with Aqua Fortis.

It burns to a great hardneſs and whiter colour; and in a violent fire to a pure white glaſs.

It is dug in many parts of Devonſhire, Cornwal, and the neighbouring Counties; the clift of the Lizard Point is almoſt wholly compos'd of it, and the adjacent little iſlands abound with it; the people of Cornwal from its colour, ſmoothneſs and conſiſtence, reſembling thoſe of the common hard ſoap, call it ſoap rock; and the late authors in general have called it Steatitis, from στέαρ ſuet, becauſe of its reſemblance to the hard fat of animals. The antients gave it the name of Cimolia, from the iſland where it was then moſt frequently found.

This is of all the Engliſh Earths the moſt worthy making trials of, for the imitating the fine Porcelain ware of China; Dr. Woodward much recommends it on this account, and repeated trials have been ſince made of it, and ſome of them very lately, in all which it has afforded the fineſt earthen ware ever made with us; and promiſes fair for equalling, with right management, any in the world.

12. *Argilla indurata albo-vireſcens levis, quæ Morochthus antiquorum.*

Smooth, green and white indurated Clay, called Morochthus.

This is the Lapis Morochthus Boet. 411. De Laet. 140. Mathiol. 1385. Muſ. Calc. 275. Morochthus aliis Leucogæa, Leucographis, Galaxius, Graphida Galactites. Worm. 71. Charlt. 30. Morochthus Aldrov. Muſ. Met. 668. Agricol. 606, and the Morochtis Meroctes or Morochites of Pliny.

It is the hardeſt of all the Earths. While in the ſtratum it is too firm to be dug with ſpades, and when it has been ſome time taken up becomes of an almoſt ſtony conſiſtence.

It is of a compact, equal and regular texture, conſiderably heavy, and of a very even, ſmooth and ſhining ſurface, nearly as ſoft to the touch as the Steatites before deſcribed; and in colour of a greyiſh white, with a greater or leſſer admixture of green; it does not at all adhere to the tongue, or ſtain the fingers in handling; but drawn along a rough ſurface, leaves a fine, ſlender, white line. It is more tranſparent than the Steatites, more difficultly diffuſible in water than even that, and not eaſily breaking in the mouth, and has ſomething of a diſagreeable brackiſh taſte; but is perfectly ſoft when diſſolved, and leaves not the leaſt grittyneſs between the teeth.

Examin'd by the Microſcope it ſhews no other than a moſt fine and equal texture.

It makes not the leaſt effervеſcence with acids.

It acquires a great degree of hardneſs, and almoſt perfectly white colour in the fire: and yields, in a very violent one, a coarſe greeniſh glaſs, with a faint caſt of purple in it.

The antients had it principally from Egypt; but it is now found plentifully in Italy, Germany, Saxony, and the iſland of Sardinia, but no where more plentifully than in France, particularly about Brianſon, whence it is there commonly call'd Brianſon Chalk.

The antients had it much in eſteem in medicine. Galen ſays it is an Aſtringent; and Dioſcorides commends it in Hæmorrhages, Cholics, Diſorders of the Bladder, and for ſtopping Defluxions of matter on the Eyes; at preſent it is known in none of theſe intentions, nor at all us'd in medicine. Its principal uſe with us is the taking out ſpots from cloths, and ſerving taylors to mark with.

The Galactites, Melitites and Morochthus, or Leucographis of the antients, have been much confounded together and miſunderſtood. Aëtius, however, has fix'd the character of this ſo clearly, that we can be in no doubt about it, by deſcribing it to have been of a greeniſh colour, and yet to have mark'd cloaths with a white line, ὑπόχλωρος γὰρ γινόμενος, ἐαν ϖαρατριβείη ἀκόνη ἢ ἱματίων τράχυτητι λευκαίνει τον τοπον. This can leave us no doubt of this ſubſtance, having been the Morochthus or Leucographis of earlier times, and I am perſwaded that a ſtrict attention to the accounts of the antients, will enable any one as certainly to determine what were the other two.

13. *Argilla indurata cinerea lævis, quæ Galactites antiquorum.*
Smooth, aſh-colour'd indurated Clay, called Galactites.

This is the Galactites Boet. 412. De Laet. 140. Aldrov. 665. Agricol. 606. Calc. Muſ. 276.

It is a very hard and dry ſubſtance, of compact, cloſe and even texture, very heavy, and of a pale, grey, or aſh colour, without the leaſt ſign of either green or purple amongſt it: It is of an even and regular ſurface, but not ſo perfectly ſmooth or gloſſy as the Morochthus; too hard to be broken between the fingers, but leſs hard than the Morochthus, and a little apt to ſtain the hands. It is very difficultly diffuſible in water, and melts ſlowly in the mouth, leaving behind it the ſmoothneſs of the Steatites or Morochthus, with ſomething of a luſcious taſte, and is of equal purity, not affording the ſlighteſt grittyneſs between the teeth: It does not at all adhere to the tongue, and if rub'd down with water on a marble, diſſolves into a ſubſtance of a pure white, reſembling milk.

Examin'd by the Microſcope it appears of an equal and fine texture.

It raiſes no effervеſcence with Aqua Fortis.

In the fire it burns to a pure white, with ſome additional hardneſs: and affords, by means of a fierce one, a pale green glaſs.

The ancients found it in the Nile, and ſome of the rivers of Greece: at preſent 'tis common in Germany, Italy, and ſome parts of France, where it is eſteem'd only a leſs valuable kind of the Morochthus.

The antients us'd it, and, as Dioſcorides aſſures us, with ſucceſs, for Defluxions and Ulcers of the Eyes; and Galen commends it as an Aſtringent; at preſent we know none of theſe uſes of it: It ſeems as if it would take ſpots out of cloaths better than the Morochthus, but is not ſo cleanly to mark with. The ſhort deſcription of Dioſcorides, that this ſtone was of a greyiſh or aſh colour, and melted into a milky juice, as clearly fixes the character of this, as Aëtius's deſcription does that of the Morochthus,

thus; and makes it very evident, that we yet have this alſo, and that it is a diſtinct ſpecies of Foſſils from the others of the ſame claſs. I had my ſpecimen of it from the neighbourhood of Florence, where all that is found is of a pure grey, and of this kind. People there have an opinion of its poſſeſſing the virtues of the eagle ſtone and facilitating delivery, which I find alſo is as old an opinion as the days of Marbodæus, who expreſly relates that of it. Lib. de Lapid. Cap. 21.

> Dat facilem Partum ſimili ratione ligatus,
> Ad femur illius quæ parturiendo laborat.

If all its virtues were like this, it is not much to be regretted that the world at preſent has forgot even the accounts of them.

It had its name from the Greek word γαλακτίζω, lactеſco, from its diſſolving into a milky liquor.

14. *Argilla indurata albo flaveſcens lævis, quæ Melitites Antiquorum.*
Smooth, yellow and white indurated Clay, called Melitites.

This is the Lapis Melitites. De Laet. 142. Muſ. Calc. 276. Boet. 416. Matth. 1385. Mellitites, Aldrov. Muſ. Met. 668. Melitites Agricol. 600.

It is a very firm ſubſtance, harder than the precedent, and but little leſs ſo than the Morochthus, of a compact denſe texture, and great weight; it is of a fine even and gloſſy ſurface, perfectly ſoft and ſmooth to the touch, and in colour of a greyiſh white, variegated in different degrees with a very pale yellow: It does not at all adhere to the tongue, or ſtain the fingers in handling; but drawn along a rough ſurface, leaves, like all the others of this claſs, a fine and even, ſlender, white line; cut into thin pieces it is very fairly tranſparent, and that equally in the colour'd ſpots as in the white, in which it differs from the others of this claſs. It is very difficultly diffuſible in water, and melts but ſlowly in the mouth, has a luſcious, and as it may be called, ſweetiſh taſte; it is perfectly fine, leaving not the leaſt grittyneſs between the teeth; and rub'd down upon a marble it diſſolves into a ſmooth thick liquor, of a yellowiſh white, much reſembling cream.

Examin'd by the Microſcope it ſhews a ſmooth, equal and regular texture.

It makes no effervеſcence with Aqua Fortis.

It burns to a clear and very fine white, without much additional hardneſs, and in a violent fire, yields a fine clear blueiſh green glaſs.

It is found very plentifully in Italy, and I ſuppoſe in all the other places where the Galactites and Morochthus are; tho' its little uſe has made it of a long time not enquir'd after.

The antients eſteem'd it a good external medicine in ulcers, and gave it internally to people about to ſuffer pain, to make them leſs ſenſible of it, but this I ſuppoſe ought to ſtand upon the ſame footing as the formers helping delivery. In the places where it is at preſent produced, it is eſteem'd no other than a ſubſtance fit for marking.

It had its name from the Greek μελί, Mel, according to Dioſcorides, from the ſweet taſte of the liquor it diſſolv'd into; probable alſo in ſome degree from its colour, which does not ill reſemble that of honey. What is call'd a ſweet taſte in this, is in ſome degree common to all theſe indurated Clays. The Steatites not being wholly without it; indeed they have beſide this, their ſmall degree of tranſparency, the ſmoothneſs to the touch, and I believe all their qualities in ſome degree in common; and all approach in ſome degree to the nature of the Talks, tho' without their particular ſtructure. They are, however, each a diſtinct and ſeparate ſpecies of Foſſils, each having its own appropriated and peculiar degree of hardneſs, beſide its particular colour.

Mathiolus cou'd find in his time no body who knew theſe ſubſtances, and many authors for a great while were in confuſion about them; but it is to be obſerv'd, that Agricola knew them well, and tells us of their being found on mountains, and in the beds of rivers in Germany and Saxony; and Cæſalpinus affirms, that all the kinds were found in the rivers of Tuſcany, ſome ſpecies he obſerves were grey, ſome black, ſome greeniſh, and others of the colour of honey, but all ſoft and ſlippery to the touch, and all affording a milky and ſweet ſolution; and diſtinguiſhes them by calling the grey Galactites, the yellowiſh Melitites, and the greeniſh Morochthus; *

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* Reperiuntur in fluminibus. Quidam cinerei, quidem nigri, alii ſubvirides, alii mellei coloris omnes tactu adeo lubrico. Ut peruncti videantur Saponis modo, omnes ſuccum lacteum reddunt & dulcem, qui igitur cinereo colore conſtat aut nigro Galactitis fuerit, qui flaveſcit mellis ſimilitudinem, præ ſe ferens merito dici poſſit melititis, ſubviridis autem Morochthus. Cæſalpin. L. 2. C. 61.

theſe indeed are ſomething of diſtinctions, but we find a more ſtrict enquiry into their nature and ſtructure will afford us more.

The medicinal virtues attributed to them, I believe are in a great degree imaginary, but it ſeems very probable they may anſwer finely, if try'd in the figuline art, and even exceed our Steatites; there is a remarkable experiment alſo in which they all ſucceed; which is, that by moiſtening them and writing with them on glaſs, they leave the letters, tho' inviſibly fix'd on it, yet not to be remov'd by waſhing, but always ready to appear, if the place be moiſten'd by breathing on it.

SECT. II. The Yellow CLAYS.

1. *Argilla flava ponderoſa tenax.*
Heavy, viſcid, yellow Clay.

THIS is a very firm, and tolerably pure Clay, of a fine equal and regular texture, and very conſiderable weight: While in the ſtratum it is of a bright and fine yellow, of a tough viſcous texture, very ductile, and cuts thro' with the ſpade with a fine gloſſy ſurface. When dry it is very hard, firm and compact, of a yellowiſh brown in colour, of a ſmooth, equal and gloſſy ſurface, very ſlightly adhering to the tongue, not to be broken between the fingers, and not at all ſtaining the hands; it is not readily diffuſible in water, melts very ſlowly in the mouth, and leaves a little grittyneſs between the teeth.

View'd by the Microſcope, it appears of a very fine texture, and is ſeen to contain a ſmall quantity of a fine whitiſh ſand.

It makes a very ſlight effervеſcence with Aqua Fortis.

It burns to a redneſs, but is very apt to crackle and burſt to pieces in the fire. Urg'd by a very violent one it is converted into a very impure blueiſh glaſs.

It is dug in moſt parts of the kingdom, and generally lies near the ſurface. In Lincolnſhire they have attempted, but in vain, to make bricks with it. In Staffordſhire and Northamptonſhire they make of it an ordinary ſort of earthen ware; and about London it is dug, principally towards Iſlington, for the uſe of the brewers.

2. *Argilla pallide flaveſcens ponderoſa tenax, cæruleo variegata.*
Pale yellow, viſcid Clay, with blue ſpots.

This is a perfectly fine and very valuable Clay, of a compact texture, and conſiderable weight. While in the ſtratum it is of a pale yellow colour, ſpotted and vein'd with blue of a tough viſcid texture, eaſily cut thro' with the ſpade, and ſhewing an equal and gloſſy ſurface. When dry it is moderately hard, of a ſomething paler colour than while in the ſtratum, and of a ſmooth even and polite ſurface. It adheres firmly to the tongue, is pretty eaſily broken between the fingers, is ſoft to the touch, and does not at all ſtain the hands. It is pretty readily diffuſible in water, melts quickly in the mouth, and is very ſmooth and ſoft, leaving not the leaſt hard particle between the teeth.

The Microſcope ſhews it to be of an even, but not over-cloſe texture, the blue ſpots are ſeen to be of a clay more denſe than the maſs, and the whole has ſomething of a laminated texture.

It raiſes a ſlight effervеſcence with Aqua Fortis.

In a moderate fire it burns to a great hardneſs and very beautiful red, and in a very violent one runs to a coarſe blueiſh green glaſs.

It is dug in Lincolnſhire, Staffordſhire, Northamptonſhire and many other places; in Staffordſhire they account it one of their beſt Earths, and uſe it in mixture for their pots, and in Northamptonſhire they make of it, work'd alone, the fineſt and thinneſt of their ware, as mugs, diſhes, &c. It being, as Moreton obſerves very juſtly, † a very fine and tough ſort of Clay, ductile to a great degree, and taking the glazing evenly and well.

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† Moreton Nat. Hiſt. of Northamptonſhire, p. 72.

3. *Argilla impurior friabilis pallide flaveſcens.*
Brittle, pale yellow, ſandy Clay.

This is a hard and very heavy Clay, of a ſomewhat looſe and incoherent texture for an Earth of this Claſs. While in the ſtratum it is of a fine, ſtrong and bright yellow colour, and a ſomething viſcid, tho' friable texture; it cuts evenly with the ſpade, and leaves a ſmooth but not at all gloſſy ſurface: When dry it is of a ſomething paler, but yet very beautiful colour, of a friable texture, and rough unequal ſurface. It adheres pretty firmly to the tongue, breaks very eaſily between the fingers, and is apt a little to ſtain the hands; it is readily diffuſible in water, and melts freely in the mouth, but is uſually very full of hard particles gritting between the teeth.

Examin'd by the Microſcope it appears of a looſe open texture, and frequently full of a fine whitiſh ſand.

It makes no effervefcence with Acids.

In the fire it acquires a deep and very beautiful purple colour, and conſiderable hardneſs, and in a very fierce one affords a tolerable pure, pale green glaſs.

It is dug in Dorſetſhire, Lincolnſhire, Staffordſhire, Northamptonſhire, and many other parts of the kingdom; there is plenty of it in a clay pit, a little beyond the brook call'd Bays Water, in the Oxford road near London. It is us'd both in Staffordſhire and Northamptonſhire for making large diſhes, and other coarſe kinds of earthen ware.

4. *Argilla impurior friabilis luteo-fuſca.*
Browniſh-yellow, ſandy Clay.

This is an impure but a very valuable Clay, of a coarſe but firm texture, and very heavy; while in the ſtratum it is of a middle conſiſtence between friable and ductile; it cuts eaſily and evenly with the ſpade, and is of a duſky yellowiſh colour and an even, but dull and not gloſſy ſurface. When dry, it is tolerable firm and hard, of a pale brown colour, with very little yellowneſs, of a rough irregular ſurface, eaſily breaking between the fingers, and not at all ſtaining the hands; it adheres ſlightly to the tongue, is readily diffuſible in water, melts eaſily in the mouth, and has ſomething of an aſtringency in its taſte, and a great deal of grittyneſs between the teeth.

Examin'd by the Microſcope, it appears of a coarſe texture, and is uſually full of a ſmall yellowiſh ſand.

It ferments very briſkly with Aqua Fortis.

In the fire it burns to a browniſh red with conſiderable hardneſs, and in a very violent one, runs to an extreamly deep and duſky green glaſs.

It is dug in moſt counties of England, and us'd in Staffordſhire, and Northamptonſhire for making garden pots, and other coarſe pieces of earthen ware.

SECT. III. The Brown CLAYS.

1. *Argilla indurata fuſca, maculis nigricantibus variegata.*
Hard, brown, ſpotted Clay.

THIS is a very fine and valuable Earth, and worthy to be much more known than it is at preſent; it is of a moſt even, regular, and cloſe texture, not very weighty, as hard as the Morochthus; and like that in very thin pieces, is in ſome degree tranſparent; it is of a fine, ſhining, pale brown colour, vein'd, ſpotted, and motled irregularly with a deep black, of a moſt ſmooth and gloſſy ſurface, very ſoft to the touch; and tho' extreamly hard, yet eaſily ſhattering between the fingers into pieces of different ſhape and ſize, according to the inviſible cracks of which, it is full in all directions; it does not at all ſtain the hands, adheres very firmly to the tongue, is eaſily diffuſible in water, and melts quickly in the mouth, it has a manifeſt aſtringency in the taſte, and is ſo perfectly pure as to leave not the leaſt grittyneſs between the teeth.

View'd thro' the Microſcope, it appears of a moſt equal and cloſe ſtructure, but every where full of fine ſmall cracks, and is a little more opake and dull in the black places than in the reſt; theſe black ſpots and lines are diſcovered to be only where there are or have been cracks, and to be owing to a fine thin cruſt of black Earth which has inſinuated itſelf into them.

It makes no efferveſcence with Aqua Fortis.

In the fire it burns to a great hardneſs and duſky brown colour, and in a very violent one, is converted into a deep green glaſs.

It is found in perpendicular figures of the ſtrata of ſtone, at four or five foot depth in the iſland of Lemnos, in conſiderable plenty.

It has not yet got into uſe in medicine, but ſeems greatly to deſerve it; I have try'd it myſelf in Fluxes and Hæmorrhages of many kinds, and generally with great ſucceſs.

2. *Argilla fuſca ponderoſa tenax.*
Brown, heavy, tough Clay.

This is a Clay of a tolerably fine and compact texture, very heavy, and generally ſpangled over with ſmall ſhining particles; while in the ſtratum it is of a dirty brown colour, of a tough viſcid ſtructure, and very firm coherence, it cuts pretty evenly thro' with the ſpade, and leaves a ſmooth and ſhining ſurface; when dry, it is of a paler and deader brown, but the ſpangles ſhew themſelves in it more clearly; it is of a rough irregular texture, and not at all ſmooth or gloſſy ſurface; it adheres pretty firmly to the tongue, is not eaſily broken between the fingers, and does not at all ſtain the hands; it melts eaſily in the mouth, but leaves ſome hard tho' not gritty particles between the teeth.

Examin'd by the Microſcope, it appears of a cloſe texture; but rough ſurface, and the ſhining particles, which are very ſmall, and of which it is very full, appear plainly to be plated fragments of Selenitæ.

It ferments briſkly with Aqua Fortis, and this muſt be owing to a native Alkaline quality in the Earth itſelf, for the Selenitæ raiſe no efferveſcence with acids.

In a moderate fire it becomes conſiderably hard, and of a reddiſh brown, and in a very violent one, affords a white but coarſe glaſs.

It is dug in moſt parts of the kingdom, and in Oxfordſhire is us'd for the flooring of barns, in Staffordſhire among the potters Earths, and at London, by the brewers: there is a pit of it near Iſlington.

3. *Argilla livido-fuſca tenax.*
Duſky, blueiſh-brown, tough Clay.

This is a very uſeful Earth, of a ſtiff, tough and compact texture, and great weight; while in the ſtratum, it is of a dead, duſky, blackiſh brown colour, conſiderably hard, yet cutting thro' evenly with the ſpade, and of a ſmooth gloſſy ſurface, and generally ſprinkled over with ſmall ſhining particles; when dry, it becomes of a paler colour, and very hard, and the glittering particles are ſeen more plainly in it; it is of a ſmooth, even ſurface, ſomewhat ſoft to the touch, and adheres ſlightly to the tongue, is not eaſily broken between the fingers, nor does at all ſtain the hands, it diffuſes ſlowly in water, melts difficultly in the mouth, has always an aſtringent, and frequently a vitriolic taſte, and contains ſome hard but no gritty or ſandy particles.

View'd by the Microſcope, it appears of a cloſe, even texture, and the ſhining particles diſcover themſelves to be plated fragments of Selenitæ.

It makes no efferveſcence with Aqua Fortis.

In a moderate fire it burns to a fair red colour, and in a very fierce one runs to a deep green glaſs.

It is dug in moſt counties in England, and indeed in moſt parts of the world; it is us'd in Staffordſhire among the potters, but its great uſe is in the making of tiles, for which it is ſo excellent as to have excluded the uſe of any other Clay; its containing no ſand makes it endure the weather better than the brick Earths; and its tough texture makes it bend into all the neceſſary forms for tiling; about London it generally lies at twelve or fourteen foot depth, and conſtitutes a ſtratum of great thickneſs.

4. *Argilla dura pallide fuſca.*
Hard, pale brown Clay.

This is a hard yet leſs heavy Clay than moſt of the preceding; it is of a rough but firm ſtructure, and generally full of ſhining particles; while in the ſtratum it is of a duſky brown, and is very firm, and hard, not to be cut evenly thro' with a ſpade, but breaking into irregular maſſes; when dry, it becomes very pale, almoſt of a ſtony hardneſs, of a rough ſurface, not ſtaining the hands, but adhering firmly to the tongue; it is very difficultly diffuſible in water, and melts ſlowly in the mouth, leaving a great quantity of hard particles between the teeth.

The Microſcope ſhews it to be a rough Clay, full of fragments of Selenitæ.

It makes a conſiderable efferveſcence with Aqua Fortis.

It burns to a great hardneſs, and a ferrugineous red, or rather purple: in a very violent fire it becomes a pale green glaſs.

It is dug almoſt all over the kingdom, and makes in Staffordſhire a very valuable kind of ſtrong veſſels, with an admixture of ſome of their tougher Clays.

SECT. IV. The Blue or Blueiſh CLAYS.

1. *Argilla ſubcærulea friabilis mollior.* *Blueiſh, friable, ſoft Clay.*

THIS is a Clay that approaches in ſome degree to the nature of the marles, while in the ſtratum it is of a blueiſh aſh-colour, in texture leſs viſcid or tough than the generality of the Clays, and ſomewhat looſe and crumbly; it eaſily cuts thro' with the ſpade, but leaves an irregular ſurface; when dry, it is light in compariſon of moſt of the Clays of a paler colour, and has little or no remaining blueneſs, eaſily crumbling between the fingers, but not ſtaining the hands; it is of a leſs ſmooth and equal ſurface than moſt Clays, and full of ſhining particles, which were leſs viſible while it was moiſt; it adheres very firmly to the tongue, is not readily diffuſible in water, and leaves a harſhneſs between the teeth.

Examin'd by the Microſcope, appears of a ſomewhat ſpungy texture, and is found to contain a conſiderable quantity of a fine yellowiſh ſand, and an infinite number of glittering fragments of Selenitæ.

It raiſes a very ſtrong efferveſcence with Aqua Fortis.

It burns to a darker colour, with very little redneſs; and in a violent fire, is converted into a coarſe blue glaſs.

It is dug in Dorſetſhire, Staffordſhire, Northamptonſhire, and in the neighbourhood of London; in Staffordſhire they make no uſe of it, but in Northamptonſhire they make of it a very coarſe but very ſtrong kind of earthen ware; which as Mr. Moreton obſerves, * bears the weather very well, but will not take glazing.

2. *Argilla ſubcærulea tenax.* *Tough, blueiſh Clay.*

This is a ſtiff, compact and fine Clay, very heavy, and of an even texture; while in the ſtratum it is of a deep, duſky, blueiſh colour, very tough, and viſcid, and conſiderably hard, it cuts thro' evenly with the ſpade, and leaves a very ſmooth and gloſſy ſurface behind it; when dry, it becomes very hard, of a pale browniſh colour, with little or no remains of blue; of a moſt even, polite and ſhining ſurface, very ſmooth to the touch, and ſcarce at all adhering to the tongue; it is not eaſily broken, nor at all ſtains the hands; it diffuſes ſlowly in water, melts with difficulty in the mouth, and is ſo fine as to leave ſcarce the leaſt ſenſible grittyneſs between the teeth.

Examin'd by the Microſcope, it appears of a moſt fine and equal ſtructure, without the admixture of the leaſt grain of ſand, but is commonly ſpangled with a few thin and ſhining fragments of a foliaceous Talc.

It makes no efferveſcence with Aqua Fortis.

In the fire it acquires a ſtony hardneſs, and fine red colour; in a very violent one, it becomes a very pure, deep green glaſs.

It is dug in Northamptonſhire, and no where elſe that I have obſerv'd in the kingdom; it is ſomething ſtrange, that it has yet been put to no uſe, ſince that county abounds with it, and it ſeems proper for making earthen ware, and very probably of a very fine kind; it is eaſy alſo to ſee from its ſtructure, that it muſt be an excellent tile Clay.

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* Moreton's North. p. 72.

3. *Argilla pallide cærulea duriſſima tenax.*
Hard, tough, pale blue Clay.

This is a very compact, firm and hard Earth, extreamly heavy and of a cloſe equal texture; while in the ſtratum, it is of a very fair, pale blue, very tough and viſcid, eaſily cutting thro' with the ſpade, and leaving a ſmooth, ſhining ſurface; when dry, it is hard, firm and compact, of a pale grey with a little blueiſhneſs intermixed, of a ſmooth, equal and gloſſy ſurface; it is ſmooth to the touch, adheres firmly to the tongue, is not to be broken between the fingers, and does not at all ſtain the hands; it is difficultly diffuſible in water, melts but ſlowly in the mouth, and leaves a little grittyneſs between the teeth.

Examin'd by the Microſcope, it appears to be a very compact Clay, containing a ſmall quantity of a fine yellowiſh ſand.

It raiſes a violent efferveſcence with Aqua Fortis.

It burns to a very pale yellowiſh colour, but is apt to crackle and burſt in the fire; in a very fierce one, it is converted into a pale green glaſs.

It is dug in Shropſhire, Dorſetſhire, and many other parts of the kingdom, and us'd in many places in pottery; it makes diſhes, gally-pots, &c. very well, and takes the glazing without difficulty.

4. *Argilla cærulea leviſſima mollis.*
Light, ſoft, blue Clay.

This is a light rare Clay, of a looſe texture, and very remarkable manner of appearance; it never forms a ſtratum of itſelf, but is always found either ſurrounding maſſes of other Earths, or lodg'd in accidental cavities, either in ſmall maſſes, or in form of powder; it is of a light looſe texture for a clay; yet has tenacity enough to ſpread in very thin plates over a large ſurface; is very light, and of a ſmooth, polite, and ſhining ſurface, not very readily diffuſible in water, and very eaſily melting in the mouth; it adheres pretty firmly to the tongue, and is perfectly fine, leaving not the ſlighteſt grittyneſs between the teeth.

View'd by the Microſcope, it appears a looſe and ſeemingly incoherent maſs, compos'd of fine and very ſmooth particles.

It ferments not in the leaſt with Aqua Fortis.

In the fire burns to a pale reddiſh brown; in a very violent one, it is converted into a brown duſky glaſs.

It is very common in moſt parts of the kingdom, tho' not much obſerv'd; it frequently lies either in very ſmall lumps, or abſolute powder, of a pale blue, and very ſoft to the touch, in the fiſſures of the firmer ſtrata, or encruſts ſmall maſſes of Clay; I remember to have ſeen much of it in powder about mount Sorrell in Leiceſterſhire; and in the great Clay-pit near Iſlington it envelopes the Argilla fuſca ponderoſa tenax before deſcrib'd, and with it makes what Dr. Woodward calls Clay, part brown, part grey, V. 2. P. 99. a 16. The true ſtate of the mixture, if it may be ſo called, is this, the brown Clay was firſt form'd into a ſtratum, and in drying, ſhrunk and crack'd, dividing itſelf into ſeperate maſſes; theſe cracks became afterwards filled up with this light and fine matter, which by the ſmallneſs of its particles, was in a condition to be carry'd by the water into all theſe little vacuities, and in the end fill'd them all up; and conſequently is now found lying in irregular lines among the ſtrata, or ſurrounding ſmall maſſes of the matter of them.

5. *Argilla durior albo-cærulea tenax.*
Hard, tough, whitiſh blue Clay.

This is affirm'd to be the Earth of which the fine China ware is made; and is a ſpecies of Clay hitherto unknown to, and undeſcrib'd by authors.

It is an extreamly fine and beautiful Earth, of a very pale blueiſh white, remarkably heavy, and of a cloſe, compact and even texture: It adheres very firmly to the tongue, is of a ſmooth, even and polite ſurface, very ſoft and ſmooth to the touch, is not to be broken between the fingers, and does not ſtain the hands, but drawn over a rough ſurface, leaves a fine ſlender white line. It melts ſlowly and difficultly in the mouth, and is not perfectly pure, but leaves a ſlight grittyneſs between the teeth: Thrown into water, it makes no ebullition, but ſlowly diffuſes, and in time wholly breaks in it, and is reduc'd to a ſubſtance like thick cream at the bottom of the veſſel.

Examin'd by the Microſcope it ſeems perfectly pure, no glaſs I could uſe being able to diſcover the hard particles.

It makes no effervеſcence with Aqua Fortis.

In the fire it burns to a ſnow white: In a very violent one it affords a pale blueiſh white glaſs.

It is dug in ſome peculiar parts of China, but, it is ſaid, is not common there; and where the pits are, is kept a great ſecret from all foreigners: It is now ſaid to be the Earth of which the fine ware of that kingdom is made, and ſeems likely to be a very noble Clay for ſuch an uſe; but probably that ware is not made of any one ſubſtance alone, but of a mixture of many.

SECT V. The Green CLAYS.

1. *Argilla vireſcens ponderoſa tenax.* *Green, heavy, tough Clay.*

THIS is a fine, ſmooth and compact Earth, of a dead duſky green, and very heavy: While in the ſtratum it is moiſt, tough, viſcid, and of a very cloſe ſtructure; it cuts very eaſily and evenly thro' with the ſpade, and leaves a ſmooth and gloſſy ſurface behind it, but is apt to fall from it in broken maſſes, ſhattering according to a multitude of natural cracks; when dry it becomes of a paler green, than while in the earth, is of a ſmooth, even and polite ſurface; adheres very ſlightly to the tongue, is ſoft and ſmooth to the touch; does not break eaſily between the fingers, nor at all ſtain the hands; it melts but ſlowly in the mouth, is of a diſagreeable taſte, and leaves a very ſlight grittyneſs between the teeth.

Examin'd by the Microſcope it appears of a fine cloſe texture, and ſpangled with a few plated fragments of Selenitæ, and a ſmall quantity of a very bright and ſhining white ſand.

It makes no effervеſcence with Aqua Fortis.

In burning it acquires a conſiderable hardneſs, and a faint browniſh red colour: In a very violent fire it is converted into a pale blue glaſs.

It is dug in Somerſetſhire, Dorſetſhire and Northamptonſhire: I have obſerv'd it in theſe counties, and it ſeems to be the green Clay of Oxfordſhire, mention'd by Dr. Plot in his natural hiſtory of that county, page 57. as lying in two ſtrata at different depths over the Ochre.

I believe it has not been any where put to trial for any uſe.

2. *Argilla indurata pallide vireſcens lævis, quæ Lapis Thyites Dioſcoridis.* *Smooth, pale green indurated Clay, the Thyites of Dioſcorides.*

This is the Thyites. Math. 1386. Boet. 415. De Laet. 142. Aldrov. Muſ. Met. 670. Cæſalp. 93.

It is a fine and elegant Foſſil, approaching to ſtones in hardneſs, but plainly appearing to be an indurated Clay, and of the ſame kind with the Steatites, Morochthus and Galactites before deſcribed.

It is of a moſt ſmooth, even and regular texture, very heavy, of a fine ſhining ſurface, and a pale green colour throughout, without any admixture of white, grey or yellow; it adheres not at all to the tongue, is remarkably ſmooth to the touch, not leſs ſo than the Steatites, and is not to be broken between the fingers, nor at all ſtains the hands; but drawn along a rough ſurface, leaves a ſlender white line: It melts very ſlowly and difficultly in the mouth, and is of a ſharp, acrid, and very diſagreeable taſte, but leaves not the leaſt grittyneſs between the teeth; held up againſt the light in thin pieces, it is in ſome degree tranſparent, and plainly approaches to the nature of the Talks, as do evidently all the other of the indurated Clays. It is very ſlowly and difficultly diffuſible in water, but when levigated on a marble, readily diſſolves into a milky ſubſtance, with not the leaſt greenneſs remaining.

Examin'd by the Microſcope, it appears of a moſt fine, equal and regular texture. It raiſes no efferveſcence with Aqua Fortis.

In the fire it loſes its green colour, coming out a plain pale grey ſtone: and in a very fierce one it becomes a foul whitiſh glaſs, but it requires a much greater force of fire to vitrify it than is neceſſary to the other Clays.

The antients found it in Æthiopia. The only place I can now learn that it is to be found genuine in, is the great mine of Goſſelaer in Saxony, from whence I received my ſpecimen; I have ſeen indeed from other places pieces of the Morochthus, which might have been miſtaken for it, by thoſe who had not ſeen the genuine; but it differs moſt evidently from that ſubſtance in the colour, and equal and univerſal diffuſion of the green, which in the Morochthus is always deeper, and laid in veins and ſtreaks, whereas the Thyites has it every where alike, and plainly owes it to a conſiderable quantity of cupreous particles.

This ſubſtance has been a great deal miſunderſtood among later writers, and ſuppos'd by many to be now loſt, becauſe they looked for it among a wrong claſs of bodies among the ſtones; many ſuppoſing it to have been a ſpecies of green marble, and ſome the Turquoiſe ſtone, that Dioſcorides meant by this name: Agricola was the firſt who gueſs'd it to be of the Morochthus kind, as it plainly is; and Dioſcorides his deſcription, tho' very ſhort, is ſufficient to determine that it muſt have been ſo, he ſays, it was of a greeniſh colour, ſomething reſembling the jaſper; but that when diluted, it yielded a milky liquor: this was ſufficient to determine it to be of the Morochthus kind: and experiment ſhews, that the green indurated Clay here deſcribed, has that property, and is evidently the thing he meant. The virtues Dioſcorides aſcribes to it in Diſtemperatures of the eyes, were plainly owing to the coppery particles it contained, which made it act as a weak kind of verdigreaſe.

3. *Argilla indurata cæruleo vireſcens lævis, quæ Terre Verte vulgo in officinis.*

Blueiſh green indurated Clay, called by the painters Terre Verte.

This is a very beautiful and very uſeful earth; while in the ſtratum it is conſiderably hard, of a very deep blueiſh green, and not form'd into even regular beds, as the Earths in general are, but lying in flat maſſes of four or five feet diameter; not always laid exactly horizontally, but often making angles of different degrees, and lying at different depths; theſe maſſes are very apt to break in the cutting, the ſpade not going regularly thro' them, nor leaving an even ſurface behind it, and the Earth is uſually brought out of the pit in lumps of different weight, from half a pound to five, ſix, or more pounds; when dry it is of a ſomething paler colour than while in the ſtratum, but of a very bright blueiſh green, of a very fine, equal and regular texture, and extreamly hard, approaching even to the Morochthus in hardneſs, but without the leaſt degree of its tendency to tranſparency: It is of a fine, even and gloſſy ſurface, is very ſmooth to the touch, adheres pretty firmly to the tongue; and does not at all ſtain the hands; but drawn along a rough ſurface, as that of cloth or the like, leaves a duſky greeniſh line: It is very ſlowly diffuſible in water, and melts difficultly in the mouth, but is perfectly fine, leaving not the leaſt harſhneſs between the teeth. It ſeems like the Morochthus and Steatites, ſomething to approach to the nature of the Talcs.

Examin'd by the Microſcope it appears of a very equal and fine texture, but in ſome places a little porous.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a great hardneſs and duſky brown colour, without the leaſt appearance of either green or blue: In a violent fire it becomes a pale blue glaſs.

It is dug in the iſland of Cyprus, and in many parts of Italy and France; that from the neighbourhood of Verona was always accounted the beſt, but there has of late been ſome dug in France that ſeems to equal it.

It is of great uſe to the painters, making one of the beſt and moſt laſting greens they have.

4. *Argilla indurata ponderoſiſſima ſordide virens.*
Deep green, heavy, indurated Clay.

This is a moſt hard, heavy and firm Earth, of an irregular but very denſe texture, and of a deep duſky green colour; it is naturally of a rude, rough and irregular ſurface, but cuts very ſmoothly and is always ſoft to the touch; it is almoſt of a ſtony hardneſs, not to be broken between the fingers, nor at all ſtaining the hands; it diffuſes very ſlowly and difficultly in water, but melts ſomewhat more readily in the mouth than the before mention'd, and leaves a brackiſh and diſagreeable taſte behind it, but not the leaſt harſhneſs between the teeth.

Examin'd by the Microſcope it appears of a coarſe rough texture, and in different parts of different degrees of green.

It makes not the leaſt effervеſcence with Aqua Fortis.

In burning it acquires a ſtony hardneſs, and very pale whitiſh brown colour. In a very fierce fire it becomes a pale browniſh yellow glaſs.

I have met with it in one part of the kingdom only, which was on Mendip hills, in Somerſetſhire: At the time I was there, which is now about ſix years ſince, they were opening three new coal pits, near the road from Sherbourn to Bath, and from each of them I ſaw a quantity of this indurated Earth thrown up among the other refuſe matter on the ſide of the openings. Into one of theſe pits I had the curioſity to deſcend, and found the ſtratum, if it might ſo be call'd, of this Earth (for it ſeem'd to lie exactly like that of Italy) at about twenty ſix feet depth; the Earth lay in a multitude of ſmall lumps like gravel, of rough unequal ſurfaces of all ſhapes, but generally ſomething flatted, and very hard; the ſtratum was about 6 inches thick, and at a foot below it there ſeem'd the end of another; from both theſe there dribbled a dirty brackiſh water, taſting manifeſtly of copper, and the people told me they had lately ſeen this Water and Earth in ſeveral pits.

Of the Earth I brought ſeveral pieces home with me, and have had it ſince try'd as a paint: It anſwers perfectly well, and is a deeper colour than either the French or Roman Terre Verte, tho' manifeſtly of that kind, and as perfectly pure as the fineſt of the Roman. Terre Verte is a ſubſtance brought from a great diſtance, and ſold at a very conſiderable price; and here is evidently as valuable an Earth, which is dug in plenty at home, and left to moulder away upon the ground as uſeleſs. I gave the people on the ſpot an account of what it was; and am pretty certain, if any of our dealers in colours will ſend thither, it may be purchas'd at a very trifling price.

5. *Argilla cinereo-vireſcens friabilis.*
Greyiſh green, friable Clay.

This is a very remarkable Clay, in that while in the ſtratum it is remarkably ductile, and when dry more brittle than almoſt any other of this Claſs. While in the Earth it is of a fair pale green, conſiderably moiſt, and tough and viſcid to a great degree, and ſeems compos'd of fine particles, and of a cloſe firm ſtructure. It cuts evenly thro' with the ſpade, falls evenly and regularly from it, and leaves a ſhining gloſſy ſurface; when dry it loſes a great deal of its greenneſs, approaching more to the grey than to the green Earths, yet never is abſolutely diveſted of it; it is of a very ſmooth, even and ſhining ſurface, adheres very firmly to the tongue, is ſoft, ſmooth and unctuous to the touch, eaſily breaks to pieces between the fingers, and does not ſtain the hands. It melts very ſlowly and difficultly in the mouth, is of an auſtere aſtringent taſte, and leaves a ſlight grittyneſs between the teeth.

Examin'd by the Microſcope it appears a very fine and cloſe Earth, containing a ſmall quantity of a pale reddiſh ſand.

It makes a ſlight efferveſcence with Aqua Fortis.

It burſts and crackles in the fire, but ſuffers very little change of colour, tho' it acquires a conſiderable hardneſs in it; in a very violent one it becomes a pale whitiſh green glaſs.

I never obſerv'd this Earth except in one place on Mendip hills, where it lay at about 15 feet deep in a thin ſtratum. Dr. Woodward mentions an Earth that ſeems to have been the ſame from Limington, in Hampſhire, but unleſs that Gentleman had given us fuller Accounts of his glorious collection, it muſt be impoſſible to make any certain references to it.

It has not been put to any uſe, but ſeems worth trying as an Aſtringent.

SECT. VI. The Red CLAYS.

1. *Argilla mollis pallide rubeſcens.*
Soft, pale red Clay.

THIS is a very fine and valuable Earth; while in the ſtratum it is of a good red, of a cloſe compact texture, moderately ſoft; and tough, or viſcid in a great degree, it cuts thro' eaſily with the ſpade, and leaves a moderately ſmooth and gloſſy ſurface; when dry, it is of a firm and compact texture, tolerably hard, of a very beautiful pale red, and commonly variegated with a grey Clay; it is of a ſmooth, polite and gloſſy ſurface, not eaſily breaking between the fingers, nor at all ſtaining the hands; it adheres firmly to the tongue, is readily diffuſible in water, melts freely in the mouth, and is of an aſtringent taſte, with very little hardneſs or grittyneſs between the teeth.

Examin'd by the Microſcope, it is of an even but not very denſe texture, and contains a ſmall quantity of a fine whitiſh ſand.

It makes not the leaſt effervеſcence with Aqua Fortis.

In the fire it acquires a ſtony hardneſs with very little change of colour, but is very apt to crackle and burſt in it; in a very violent one, it becomes of a looſe, ſpungy ſemi-vitrify'd texture, and of a pale green.

It is dug in the Iſle of Wight, and ſome other places, but is not common; it is brought to London in conſiderable quantities from the iſland juſt mention'd, and is ſaid to be us'd by the workers in mahogany, to give a redneſs to that wood when new wrought; it need not, however, be brought from ſo diſtant a place, for at Hedgerly near Windſor, there is a large ſtratum of it in the hill over the great loam-pits, and that very near the ſurface.

2. *Argilla lævis e fuſco pallide rubeſcens.*
Pale, browniſh red, ſmooth Clay.

This is a very fine and uſeful Clay; while in the ſtratum, it is of a pretty fair red, but with ſomething of a browniſh caſt, and commonly vein'd, and ſtreak'd with the pale greyiſh blue Clay, deſcrib'd at Sect. 4. N°. 3. in clouds, ſpots, and ſometimes regular cylindrick pieces; it is conſiderably heavy, and of a very cloſe and even texture, it cuts evenly thro' with the ſpade, and leaves a gloſſy ſurface; when dry, it is a fine and very compact maſs, and of a paler and ſomething browner colour, the variegations alſo appearing paler; it is of a compact, firm texture, a ſmooth gloſſy ſurface, very ſoft to the touch, breaking tolerably eaſily between the fingers, and not at all ſtaining the hands; it adheres very firmly to the tongue, is readily diffuſible in water, melts freely in the mouth, and leaves not the leaſt hard particle between the teeth.

Examin'd by the Microſcope, it appears of a fine and laminated texture.

It raiſes a conſiderable effervеſcence with Aqua Fortis.

In the fire it cracks and burſts, but acquires a very conſiderable hardneſs, and fine red colour; in a violent fire, it is converted into a very coarſe green glaſs.

It is dug in Shropſhire, Lincolnſhire, Northamptonſhire, and Staffordſhire, I have of it alſo from the Hedgerly loam-pits; it is very much eſteem'd in Staffordſhire, and enters the compoſition of their fineſt earthen ware.

3. *Argilla lævis e fuſco ſordide rubeſcens.*
Duſky, browniſh red, ſmooth Clay.

This is a very fine and ſmooth, but very compact Earth; while in the ſtratum it is of a deep duſky brown, with a conſiderable degree of redneſs, and ſometimes ſpotted with a blueiſh Clay; it is conſiderably weighty, and very ſtiff, tough, and viſcid; it cuts equally thro' with the ſpade, and leaves a gloſſy ſhining ſurface; when dry, it is of a much paler brown, with very little redneſs, of a conſiderable hardneſs and cloſe, compact texture; it adheres but very ſlighly to the tongue, does not break eaſily between the fingers, nor at all ſtain the hands; is not readily diffuſible in water, melts but ſlowly in the mouth, is of an aſtringent taſte, and leaves not the leaſt grittyneſs between the teeth.

Examin'd by the Microſcope, it appears of a fine, cloſe and even ſtructure.

It raiſes a conſiderable effervefcence with Aqua Fortis.

It burſts and crackles in the fire, but if rightly managed, burns to a ſtony hardneſs, and recovers its red colour, and in a very violent one becomes a pure blue glaſs.

It is is dug in Northamptonſhire, Staffordſhire, Yorkſhire, and at Hedgerly near Windſor; it is one of the moſt uſeful and valuable Earths in the Staffordſhire pottery, and is a principal ingredient in the very fineſt of their ware.

From what I have learnt from my own obſervations on the potters Clays, and the ſpecimens I have received of them from different places; I am clearly convinc'd that very few of them are peculiar to the places where they are wrought, but that there are many other places now not thought of, where the figuline trade might be carryed on with great advantage; at Hedgerly in particular, where they at preſent make but very little uſe of their Earth this way; I am confident, as fine ware might be made as that of any part of this kingdom, and as the Loam, which is the valuable Earth now dug there begins to fail, the proprietor may think himſelf happy that he has it in his power to fall into another perhaps more profitable trade; and I hope will have the prudence to do it.

SECT. VII. The black CLAYS.

1. *Argilla nigreſcens friabilis levis.* *Light, friable, black Clay.*

THIS is an impure black Earth, known in ſome counties of England by the name of Cullow, or Killow; it ſometimes forms regular ſtrata, and at others, is found in looſe detach'd maſſes among gravel, rubble ſtones, and in other of the looſer ſtrata.

While in the Earth, it is of a pure deep black, dryer than the generality of the Clays, and leſs viſcous or tough, it cuts eaſily with the ſpade, but falls into rude irregular maſſes of rough ſurfaces; when dry, it retains in a great meaſure its blackneſs, is lighter than moſt of the Clays, and of a ſomewhat looſer texture, of a rude uneven ſurface, and ſomething of an imperfectly plated ſtructure; it adheres pretty firmly to the tongue, is ſmooth but not ſoft to the touch, breaks pretty readily between the fingers, and ſlightly ſtains the hands; it melts freely in the mouth, but is of a very ſharp unpleaſant taſte, and leaves a little grittyneſs between the teeth; thrown into water, it makes a ſlight ebullition, and after ſome time falls into ſmall lumps, and afterwards into powder; it ſeems an Earth more impure and uncertain as to its Genus than almoſt any other; it evidently approaches to the nature of the marles, and in ſome degree to that of the black Ochres, but as it more than all the reſt partakes of the nature of the Clays, it could not but have a place here; as its frequency in ſome counties, and conſtantly keeping up to the ſame ſtructure, cannot but make it a diſtinct ſpecies.

Examin'd by the Microſcope, it appears of a rough, ſpungy, irregular texture, full of a ſmall greyiſh ſand, and often of fragments of Selenitæ.

It makes no effervefcence with Aqua Fortis.

When thrown into the fire, it generally emits a ſlight blue flame with a ſulphureous ſmell, and burns to a very deep red; the flaming of this ſubſtance is not owing to any bituminous principle in it, but merely to this, that it contains generally a vaſt quantity of the matter of common Vitriolic Pyrites, which occaſions its diſagreeable taſte, and when in the fire burns as all the Pyritæ do, and like them calcines to a red matter like Colcothar Vitrioli.

It is common in many parts of England, Wales and Ireland; on Mendip Hills, I have frequently ſeen the detach'd nodules of it thrown up; and near Sherborn in Dorſetſhire, remember a ſtratum of it at a conſiderable depth; that in looſe maſſes, is generally ſomething harder than that of the ſtratum, but they anſwer exactly alike in all trials, and are in time equally liable to ſhatter and fall to pieces, from the ſalts ſhooting by means of the humidity of the air.

2. *Argilla nigra ponderoſa tenax, quæ Terra Pnigitis Galeni.*
Tough, heavy, black Clay, the Pnigitis of Galen.

This is a ſtiff, denſe, compact, and very fine Clay; while in the ſtratum it is of a fine, ſhining jet black, extreamly heavy, moderately moiſt, and of a moſt tough, viſcid texture, cutting thro' eaſily and evenly with the ſpade, and leaving a fine gloſſy, ſmooth ſurface behind it; when dry, it is of the ſame fine black, as while in the ſtratum; extreamly hard, heavy and compact, of an equal ſmooth and ſhining ſurface, not at all adhering to the tongue, ſoft and ſmooth to the touch, not to be broken between the fingers, nor at all ſtaining the hands; it is very ſlowly diffuſible in water, and melts difficultly in the mouth, but is perfectly fine, leaving not the leaſt grittyneſs between the teeth.

Examin'd by the Microſcope, it appears to be a moſt fine, compact and equal ſubſtance.

It makes not the leaſt efferveſcence with Acids.

In the fire it acquires a ſtony hardneſs, and pale red colour; but in a very violent one, affords a pure and almoſt perfectly white glaſs.

It was originally dug in many parts of Greece, and us'd in medicine; of late it has been in a manner loſt to remembrance, but is to be found in ſeveral parts of this kingdom; I remember to have ſeen it in Staffordſhire, and lately met with a ſtratum of it in the great Clay-pit behind St. George's Hoſpital, at Hyde-Park-Corner, at the depth of about 25 foot; it is an Aſtringent, and good in Hæmorrhages of all kinds.

There is perhaps no one ſubſtance of all the foſſile kingdom, ſo variouſly deſcribed by the writers on theſe ſubjects, as what they have called the Pnigitis; Dioſcorides deſcribes it to be like the Terra Eretria, hereafter to be deſcribed in colour, that is of a pale grey, cold to the touch, adhering ſo firmly to the tongue, as to hang to it ſuſpended; and adds, that it was dug in large glebes; nay, he goes ſo far as to ſay, it was ſomeimes ſold in the place of the Eretria; which makes it evident, that it muſt have been very like it, and conſequently a marle of a pale grey colour. Pliny, who wrote ſoon after that author, confirms alſo this account; his words are, *Pnigitis Eretriæ ſimillima eſt grandioribus tantum glebis & glutinoſa*; that is, ſticking to the tongue, for that is evidently what he means by glutinous in this place where he is indeed plainly copying Dioſcorides, tho' the novelty, and at that time uneſtabliſh'd character of that author made him not chuſe to name him; Galen, Paulus Ægineta, and a multitude of after writers, however affirm it to be black, and like the Ampelites; nay, Galen evidently deſcribes it to have been a tough, ſtiff and viſcid Clay, a ſubſtance not leſs different in colour than in texture from what the earlier writers made it; and Agricola deſcribes it to be black, denſe, ſoft, and partly Aſtringent, partly Acrid; and Galen as conſiſting of an aſſemblage of different particles: It is no wonder, that from ſuch very different accounts of the earlier writers, there ſhould have been great confuſion among the leſs cautious ſince, about the Terra Pnigitis, which, according to the author moſt confided in, ſome call a black, denſe, tough Earth, that is, according to the regular diſtinctions, a Clay; and others, a grey, looſe Earth or Marle; and one is for finding it among the Fullers Earths, as Cæſalpinus; another among the black Chalks as they are commonly called, as Agricola; and that one ſhould call it Acrid, and another Aſtringent; but if we will be at the pains of examining attentively the different accounts of the antients, and conſidering the order of time in which they wrote, and withal the origin of the name, we ſhall find a clue that will eaſily lead us thro' this labyrinth of ſeeming perplexity and error; we ſhall find in ſhort, that theſe authors do not in reality contradict one another at all, but are giving different deſcriptions, not of the ſame, but of two very different ſubſtances; the name of this ſubſtance, was only an adjective deriv'd from the name of the place where it was dug; and if an Earth was to be called Pnigitis, becauſe dug near Pnigeos, a black one might at one time be as properly ſo call'd as a grey one had at another; the medicinal Earth therefore brought from this place in the time of Dioſcorides and Pliny, was a grey Marle, hereafter to be deſcrib'd; and this was properly ſpeaking the Pnigitis of the antients; but it happened, that afterwards a medicinal Earth of another colour and texture, a black, tough and viſcous Clay, was found about the ſame place, and thence ſent into different parts of the world, and call'd for the ſame reaſon by the ſame name: This was the Pnigitis of Galen, and the later writers, and is evidently the Earth here deſcrib'd, and this becoming much us'd, baniſh'd the remembrance of any other ſort of Earth from the ſame place; the genuine nature of this Earth was, that it was a mild Aſtringent; and this acrid quality, which has puzzled ſome authors ſince ſo much to account for in it, is properly no quality of it, but an accidental thing occaſion'd by a mixture of adventitious particles with it; every one knows how frequently Clays are found ſaturated with the matter of the common vitriolic Pyrites; this was unqueſtionably ſubject in ſome places to the ſame accident, and became by it acrid, perhaps in a high degree; but it was doubtleſs oftener found without than with this extraneous mixture, and when it had any thing of it, ought no longer to have been look'd upon as the true Pnigitis of Galen, nor us'd as ſuch in medicine.

3. *Argilla ponderoſa nigra friabilis.*
Heavy, friable, black Clay.

This is a very hard and dry, but very fine Clay, of a ſmooth compact texture, and great weight: While in the ſtratum it is of a duſky black, not viſcid or tough, but hard, dry and friable, not cutting evenly thro' with the ſpade, but breaking into irregular maſſes of rough ſurfaces; when dry, it is of a fine, but not gloſſy black, of a crumbly friable texture, of an unequal and irregular ſurface, but ſoft to the touch, and not ſtaining the fingers in handling; it diffuſes itſelf very ſlowly in water, melts difficultly and diſagreeably in the mouth, adheres firmly to the tongue, and leaves not the leaſt grittyneſs between the teeth.

Examin'd by the Microſcope it ſhews an even and regular ſtructure, and great fineneſs of parts.

It makes no effervefcence with Aqua Fortis.

And which is very remarkable, burns to a perfect whiteneſs in the fire; but in a very violent one is converted into a fine green glaſs.

It is found in many parts of the kingdom, and generally lies deep; I have ſeen of it in Suſſex, Hampſhire, and Yorkſhire; and in Northamptonſhire it is dug and us'd to make tobacco pipes, which are as white as any in the world.

SERIES I.

CLASS I. ORDER I. GENUS III.

MARLES.

EARTHS but ſlightly coherent, not ductile, ſtiff, or viſcid while moiſt, moſt eaſily diffuſible in, and diſunited by water, and by it reduc'd into a ſoft looſe incoherent maſs.

SECT. I. The White MARLES.

2. *Marga alba ponderoſa friabilis, quæ Terra Cimolia antiquorum.*
Ponderous, friable, white Marle, the Terra Cimolia of the ancients.

This is the Terra Cimolia of Theophraſtus Ed. Noſtr. 142. Plin. L. 35. p. 718. Creta Cimolia Aldrov. 245. Terra Cimolia Tournf. Voy. 113. and the Terra Cimolia of Dioſcorides and Galen.

It is a heavy but very lax and crumbly Earth; while in the ſtratum it is of a dull dead white, moderately moiſt, but not at all tough or viſcid; it cuts eaſily thro' with the ſpade, but leaves a rough uneven ſurface, and often breaks into rude irregular pieces in the digging; when thrown upon the ſurface of the Earth, if left there, it quickly moulders away; but when taken up and dry'd, becomes of a pure bright white, of a conſiderably cloſer texture, and of a ſomewhat irregular ſurface, but very ſoft to the touch: It adheres firmly to the tongue, is eaſily broken between the fingers, and ſtains the hands; thrown into water it raiſes little or no ebullition, but if carefully attended to, gives a ſmall hiſſing noiſe, and almoſt immediately diffuſes into a ſmooth whitiſh uniform matter like cream, with an inconſiderable quantity of a ſmall, but very hard ſand at the bottom; it melts freely in the mouth, but leaves a conſiderable harſhneſs between the teeth.

Examin'd by the Microſcope it appears a looſe Earth, of a very irregular texture, and contains a ſmall quantity of a fine white ſand.

It makes a very conſiderable efferveſcence with Aqua Fortis.

It burns to a pure ſnow white in a moderate fire: and in a very violent one, runs to a coarſe greeniſh glaſs.

It is found in ſeveral of the iſlands of the Archipelago, particularly Siphanto, and that from whence it originally had its name, which is now call'd Argentiere; it generally lies either on the ſurface, or within a foot of it: And is ſtill us'd there, as of old, in the cleaning of cloths. The antients us'd it alſo in medicine; Galen ſpeaks of it as good in the St. Anthony's fire; and Dioſcorides highly commends it mix'd with vinegar, in Swellings, Inflammations, and many other external affections; and ſeems very cautious, that people ſhou'd procure it genuine, and not uſe ſpurious Earths in its place: Theſe uſes, however, are quite forgotten now, which indeed we are not to wonder at, when the knowledge of the Earth itſelf, is, in a manner, loſt too; for neither of the two Earths we at preſent know under the name of Cimolia, were known to the antients under that name: Our Cimolia alba, and the Purpuraſcens, as we call the other, are the white tobacco pipe clay, and common fullers earth, which laſt is but very badly expreſs'd by the epithet Purpuraſcens, which it has of late been call'd by. The antients indeed every where mention two Terræ Cimoliæ, a white and a purpliſh, and we have them both yet well known among us, tho' we ſeem never to have found out that they were the ſubſtances deſcribed by theſe authors: The white is the kind here deſcribed, ſufficiently diſtinguiſh'd from what we call Cimolia Alba, our tobacco pipe clay, by its want of tenacity, and its alkaline quality; and is indeed of another claſs of Foſſils, a Marle, and not a Clay; and the purple, which we have of late, for no one viſible reaſon in the world, judg'd to be the common fullers earth, was in reality the Steatites, or ſoap rock as we uſually call it, deſcribed before, N° 11. Sect. I. Theſe therefore were the white and the purple Cimolia of the antients; with the things we now commonly know by thoſe names, the deſcriptions of the antients can by no means be made to agree, unleſs Marle and Clay are the ſame ſubſtance, and purple and a greeniſh brown the ſame colour, they have therefore hitherto been of no uſe to us; but with theſe ſubſtances which I wou'd underſtand them to mean, they every way agree, and are, ſo far as they go, good and exact deſcriptions.

Galen ſays, that the white Cimolia was dry, and the purple fattiſh, and that the purple was accounted the beſt; and Dioſcorides, that the purple had naturally ſomething of a fattyneſs in it, and was cold to the touch; which laſt is a particular very obſervable in the Steatites, and naturally ariſing from its ſtructure.

Pliny alſo obſerves of one of the kinds he names, that it was ſo hard as to be call'd by ſome a Stone, quam vocant Saxum, which is applicable to the Steatites in a very high degree, and not in the leaſt ſo to any other Earth yet underſtood to be meant by theſe names. To all which, it may be no ſmall confirmation to add, that the Steatites, the very ſame with that of Cornwal, is common in that part of the world, and frequently brought thence by people curious in theſe things: And that by whatever means it happened, that Mr. Tournefort did not obſerve it, I have been ſo fortunate as to receive two very fair ſpecimens thence. The white kind, we have the abundant teſtimony of the antients, was very common there, and even Ovid mentions what he calls the Cretoſa rura Cimoli, which was a very natural miſtake in him; as a white Earth inattentively view'd, was much more likely to be call'd a chalk, than by any other name.

2. *Marga friabilis levis albeſcens, quæ Terra Melitenſis authorum. Light, friable, whitiſh Marle, call'd Earth of Malta.*

This is the Terra Melitæa Schrod. 317. Terra Melititenſis Charlt. Foſſ. 4. Worm. 6. Aldrov. Muſ. Met. 253. Terra ex Melita Inſula Muſ. Calc. 130. Terra Melitenſis Gratia Sancti Pauli Mont. Exot. 14.

It is a looſe and crumbly light Earth; while in the ſtratum it is of a duſky and ſomething yellowiſh white, remarkably dry, and of a looſe unequal texture; it cuts irregularly under the ſpade, and generally falls in large ragged pieces: When thrown upon the ſurface of the Earth, it very ſoon falls into a fine ſoft powder, but if laid out of the way of injuries of the weather, it dries into a light looſe maſs, of a dirty white colour, ſometimes having a caſt of greyiſhneſs, and ſometimes a faint one of a duſky browniſh yellow, it is of an irregular ſurface, ſomewhat rough to the touch, and adhering firmly to the tongue, eaſily breaking between the fingers, and ſlightly ſtaining the hands: it melts readily in the mouth, but leaves a little grittyneſs between the teeth: Thrown into water, it makes a kind of ſlight ebullition, with a hiſſing noiſe, and in a very little time ſwells into a much larger bulk, and then crumbles into a fine looſe powder.

Examin'd by the Microſcope it appears a looſe ſpungy Earth, containing a ſmall quantity of a fine white ſand.

It raiſes a very conſiderable effervefcence with Aqua Fortis.

In a moderate fire it burns to a fine white; and in a very fierce one, to a deep green glaſs.

It is found in great plenty in the iſland of Malta, and in no other place that I have ever been certainly inform'd of. It lies at all depths, and often on the ſurface, and that not in one place only, as is generally ſuppos'd, but almoſt all over the iſland.

It has been long eſteem'd a remedy againſt the bites of venemous animals, but at preſent is unknown in the ſhops; the Bole from the ſame place before deſcribed, being now only known as a medicine from thence, and even that is very ſeldom heard of in preſcription, and yet more ſeldom found genuine.

3. *Marga albiſſima mollis, quæ Terra Samia alba & Collyrium Samium Dioſcoridis.*

White, ſoft Marle, called Terra Samia, and Collyrium Samium.

This is the Terra Samia Charlt. Foſſ. 3. Aldr. Muſ. Met. 239. Theophr. Ed. Noſt. 145. Matth. 1391. Worm. 5. and the Terra Samia of Dioſcorides, Galen, and Pliny.

It is a very fine and pure Earth, of a cloſe, equal and regular texture, and yet remarkably light; while in the ſtratum it is not ſoft, or moiſt, but firm and very dry, of a fine clean white in colour, and not cutting into regular or even pieces, but breaking according to a number of ſlender crevices, or inviſible cracks, into lumps of various ſhape, ſize and figure: When dry it becomes of a very fine and bright white, and is of a cloſe, compact, and even texture, and of a fine, ſmooth and polite ſurface; it is very ſoft to the touch, adheres firmly to the tongue, is eaſily broken between the fingers, and does not at all ſtain the hands, but drawn along a rough ſurface, leaves a fine clean white line: It melts but ſlowly in the mouth, but when diſſolv'd, is perfectly fine, and leaves not the leaſt harſhneſs between the teeh: Thrown into water, it ſends up a few bubbles, with a ſoft hiſſing noiſe, but diffuſes much more ſlowly in it than the generality of the Earths of this claſs.

Examin'd by the Microſcope it appears of an even, regular and perfectly fine texture, without the leaſt admixture of hard particles of any kind.

It raiſes not the leaſt effervefcence with Aqua Fortis.

In burning it acquires a perfect ſnowy whiteneſs; and in a violent fire runs to a fine deep green glaſs.

It is found in the iſland of Samos, and no where elſe that we know of in the world, and never is ſeen to conſtitute a regular ſtratum among other Earths, but is found in the perpendicular fiſſures and horizontal ſpaces, between the ſtrata of a hard greyiſh ſtone. It is remarkable, that Theophraſtus's account ſhews it to have been ever lodg'd in this manner; for he tells us, that the diggers there in his time, cou'd not ſtand upright at their work, but were forc'd to lie along on their backs, or on one ſide; for that the vein of Earth they dug ran length way, and was only of the depth of about two foot, tho' much more in breadth, and encloſ'd every way with ſtones; at this time, however, it is not dug exactly in that manner, but is found in the perpendicular fiſſures of the ſtrata, lying up to the ſurface, and is of that kind of Earths, call'd thence Medullæ Saxorum, but very different from any of the European kinds.

The antients in general have deſcrib'd two kinds of the Samian Earth, the Collyrion and After, as they were call'd; theſe were the one white now deſcrib'd, and the other browniſh, to be mention'd hereafter; they ſeem, however, not to have exactly agreed about which of the two ſhou'd be call'd by the particular names; they have in general indeed given us room to believe they call'd the brown Collyrion, and the white Aſter; but Dioſcorides diſſents from this, and evidently makes the white here deſcribed the Collyrium; for after he has deſcribed it to be perfectly white, light, adhering to the tongue, and of an even texture, yet ſoft and friable, words which moſt happily deſcribe the Earth now brought thence, and here deſcribed; he adds, of this ſort is that which is call'd by ſome, Collyrium; and there is this farther proof of it, that he afterwards deſcribes in as expreſs and ſtrong terms the other, or brown Samian Earth, next to be deſcrib'd under the name of the Aſter; the white therefore is evidently the Collyrium Samium of Dioſcorides, and the browniſh the Samius Aſter, tho' the general opinion of others ſeems to mean the contrary, and the derivation of the name Collyrium to imply, that the Earth meant by it was not white, but aſh colour'd Κολλυρα, properly and exactly ſignifying a bak'd loaf, or cake of bread of an aſh colour. This Earth is alſo plainly that meant by Theophraſtus in his general account, where he ſays, that the painters did not uſe it tho' very beautiful, becauſe it was fat, denſe and unctuous; whereas thoſe of a looſer texture, crumbling and dry, and without fatneſs, were fitter for their purpoſes; for had he meant the browniſh Samian Earth, he would have known its texture was juſt ſuch as he had deſcrib'd that the painters wanted in their Earths.

4. *Marga friabilis albofuſca ſcintillans, quæ Samius Aſter Dioſcoridis. Browniſh white, friable, ſhining Marle, call'd Aſter Samius.*

This is alſo one of the Earths meant by the name Terra Samia among authors. It is a looſe lax Earth, and extreamly different from the precedent in almoſt all particulars; while in the ſtratum it is of a duſky white, with ſome admixture of a paleiſh brown, and all over ſpangled with ſmall glittering particles; it is of a looſe, friable and incoherent texture, and will not be cut evenly or regularly, as moſt of the other Earths, but falls to pieces in uneven ſmall lumps of all ſhapes, and of rough ſurfaces; they are generally, however, tending to flatneſs, and are more apt to ſplit into lamina, than break any other way. When dry, it is of a very pale browniſh white, of a looſe ſhattery texture, and rough duſty ſurface, and ſhews itſelf plainly of a plated or cruſtated ſtructure; it is rough, dry and duſty to the touch, adheres firmly to the tongue, crumbles very eaſily between the fingers, and does not ſtain, tho' it duſts the hands in touching it; it melts readily in the mouth, but leaves a conſiderable grittyneſs between the teeth: Thrown into water it raiſes no bubbles, nor makes any hiſſing, but immediately ſwells in bulk, and falls into a multitude of very thin flakes, and from them into a fine powder.

View'd by the Microſcope it appears of a coarſe looſe texture, laminated or compos'd of a multitude of ſtrata laid one on another, and finely ſpangled thro' its whole ſurface, with plated fragments of Selenitæ.

It raiſes no efferveſcence with Aqua Fortis.

In the fire it acquires a pale aſh colour: In a very violent one it is converted into a pale blueiſh green glaſs.

It is found in the fiſſures of ſtone, in the iſland of Samos, and often in very conſiderable quantities.

From what has been before obſerved, it is plain, that this was the Samian Earth call'd Aſter by Dioſcorides, and that probably becauſe of the ſhining and glittering Appearance it has from the fragments of Selenitæ immers'd in it; as thoſe who call'd it the Collyrium, probably, had for their reaſon, the colour it acquir'd after they had prepar'd it for uſe by burning; for it has been already obſerv'd, that aſh-colour'd is the proper ſignification of that word; and that this in burning acquires exactly that colour: But, however uncertain it may be among the other old authors, which was which of the two; it is very clear which Dioſcorides meant as each, for he has deſcrib'd this kind as perfectly as the other; and indeed as plainly in ſo few words as I can do, who have a ſpecimen of it lying before me; he ſays that it is of a plated or cruſtated texture, which is one very ſingular particular of it, and alone ſufficient to diſtinguiſh it from the other, and from moſt other Earths of the ſame kind.

The antients prepar'd theſe Earths by burning and waſhing, and then us'd them with great ſucceſs internally in Hæmorrhages and Fluxes of all kinds, and externally in Inflammations. They had alſo many other uſes, and were greatly valu'd; they were eſteem'd the beſt of all ſubſtances for cleaning armour, and were the fineſt Earths of the potteries of the antients; of this we have frequent confirmation in the old Poets.

En! tibi læta trahant Samiæ Convivia Teſtæ! Tibullus.
Non pudeat Samio te Maſſica fundere Vaſo. Pamphilius.

And Plautus, *Genio ſuo ubi quando ſacrificat, ad rem divinam quibus & opus Samiis vaſis utitur.* Theſe veſſels, it is probable, were made from a mixture of the two Earths deſcribed above, with the addition of ſome tough and viſcous Clay.

5. *Marga candido-cinerea denſa læviſſima mollior, quæ Terra Chia antiquorum.*

White, ſmooth and ſoft Marle, call'd Earth of Chios.

This is the Terra Chia Charlt. Foſſ. 4. Worm. 5. Aldrov. Muſ. Met. 247. Matth. 1391. Calc. 125.

It is a denſe and compact earth, yet very ſoft, and of a texture readily broken by water; while in the ſtratum it is of a duſky greyiſh or blueiſh white very dry, and of a ſhattery texture, not to be cut evenly thro', or leaving a ſmooth equal ſurface behind the ſpade, but breaking in the digging, and always falling into large, rough and irregular, but flat pieces: When thrown upon the ſurface of the Earth, it ſoon breaks into an impalpable powder, or melts into a ſubſtance like butter, and ſinks into the Earth again; when dry'd it is of an irregular ſurface, and of a pale greyiſh white, of a looſe crumbly texture, and always laminated or compos'd of a number of flakes; it is moſt remarkably fine and ſoft to the touch, adheres firmly to the tongue, is very eaſily broken between the fingers, and a little whitens the hands in touching it; it melts very freely in the mouth, and leaves not the leaſt grittyneſs between the teeth: Thrown into water, it ſends up a number of bubbles, with a conſiderable hiſſing noiſe, and after that ſwells, and gradually melts into a ſubſtance like thick cream.

The Microſcope ſhews it to be a very fine and pure Earth, compos'd of equal particles, containing no extraneous matter of any kind, and made up of an almoſt infinite number of thin plates or lamina laid on one another.

It raiſes a very conſiderable efferveſcence with Aqua Fortis.

In the fire it acquires a perfect whiteneſs, without any additional hardneſs; but in a very violent one is chang'd into a grey half vitrify'd maſs.

It is dug in the iſland of Chio, and not any where elſe that I have yet heard of: The antients us'd it internally as an Aſtringent, but its great uſe was as a Coſmetic, the ladies eſteeming it the fineſt of all things for cleanſing the ſkin, and defacing wrinkles.

The antients have left us no room to doubt, that the Earth now to be found in this iſland, and here deſcribed, is the very ſame with what they us'd. Galen tells us, theirs was an earth of a white colour, but not a bright clear white, and that it was brought in flat pieces as this ever is; and Dioſcorides, that it was whitiſh, but tending to aſh colour, and of a plated texture, and compos'd of thin cruſts; whether it wou'd be worth importing for medicinal uſe, remains yet to be determin'd, but it is very certain that it may be had, as may moſt, if not all the other Earths of the antients; and I cannot but think it wou'd be a worthy undertaking to try them all fairly, and find how much reaſon the antients had for the praiſes they beſtow upon them.

6. *Marga fungoſa friabilis albiſſima levis, Agaricus Mineralis & Creta Seleneuſiaca dicta.*

Looſe, friable, light and white Marle, called by late authors, mineral Agarick, and by the antients, Earth of Seleneuſia.

This is the Stenomarga Agricol. 378. Marga Feroenſis Charlt. Foſſ. 4. Agaricus Mineralis Cod. Med. V. and the Creta Selenuſia, Aldrov. Muſ. Met. 248. Terra Selenuſia, Matth. 1392. Muſ. Calc. 126. and when in form of an impalpable powder, is called by ſome Lac Lunæ.

It is an Earth ſubject to various mixtures, and frequently mixing itſelf with various other bodies; it is, however, generally found pure, and is then the ſame in all parts of the world; it never conſtitutes a ſtratum in the Earth, but is found in the perpendicular fiſſures of the ſtrata of ſtone and in a thouſand imperceptible cracks in them, at which they naturally ſhiver and fall in pieces, and diſcharge this Marle from them in form of a fine white powder, as alſo in the accidental horizontal vacuities frequent in the ſtrata of ſome quarries; and on the roofs of others; in theſe different places it is found either in irregular maſſes, of a fine and pure white, porous, friable, ſtaining the fingers, and adhering firmly to the tongue, or in ſmaller and ſomething firmer maſſes, or laſtly, in form of an impalpable powder of a ſnow white colour; the lumps of it cut with a tolerably even ſurface, but are very apt to crumble, are ſoft to the touch, melt freely in the mouth, and leave not the leaſt harſhneſs between the teeth; thrown into water, they ſend up a number of bubbles with a hiſſing noiſe, and inſtantly diffuſe in it, and give it a milky colour.

View'd before the Microſcope, it appears of a looſe and rare texture, but compos'd of extreamly fine particles, and containing no extraneous matter.

It raiſes a very conſiderable effervеſcence with Aqua Fortis.

In the fire it burns to a perfect ſnow white, and is very difficultly vitrify'd, but the glaſs it yields is of a greeniſh white.

It is very apt to be debas'd from this purity which it naturally has, by an admixture of extraneous particles; and I have ſeen it from ſuch accidents, browniſh, yellowiſh, and reddiſh, but the Microſcope always diſcovers the adventitious particles, that give it theſe colours; its extream fineneſs alſo makes it find way into many other bodies; it is often preſent, I believe, where we little ſuſpect it, and ſeems the moſt common debaſing matter of the fouler cryſtals.

It is found wherever there are quarries of ſtone thro' the whole world as far as can be learned from accounts: In the Eaſt-Indies it is common, many parts of America abound with it, and all parts of Europe afford it. It is frequent enough in England, but Germany furniſhes the greateſt quantities of it; the fineſt I have ever ſeen is that from Sicily, the place from whence the antients had their Terra, or as ſome call'd it, Creta Selenuſia, which all their deſcriptions prove very plainly to have been this very body: Dioſcorides deſcribes that to have been of a very bright and ſhining white, friable, and very readily diſuniting and diffuſing itſelf in water: Galen has even copied this author's words in his account of it, and Pliny gives the very ſame deſcription of it, adding, that it immediately became reſolv'd into a kind of fluid in water, *in aliquo humore vel liquore poſita illico mutatur in ſuccum*; which are qualities ſo very applicable to this Earth, and ſo much leſs ſo to almoſt any another, that I am ſurprized it never occurr'd to any one to obſerve this before; it was us'd antiently by the phyſicians as an Aſtringent, and among the ladies as a Coſmetick, for which laſt uſe Dr. Plot alſo commends it from perſonal experience at this time.

7. *Marga fungoſa candida denſior.*
White, fungous, denſe Marle.

This is a ſpungy, or fungous Earth, of an impure white in compariſon of the former, and of a more denſe texture; it frequently is found in the cavities of ſtones, but in its natural ſituation forms a ſtratum in the Earth, generally lying very near the ſurface; while in the ſtratum, it is of a duſky white colour, of a denſe and ſomewhat firm tho' porous texture, and of a rough, uneven ſurface; it is generally ſomething moiſt, but yet does not cut eaſily thro', but breaks under the ſpade into rude and rough lumps of uneven ſurfaces; if left on the Earth, the weather ſoon diſſolves and ſends it again into the ground, but if dry'd, it becomes of an uneven but compact texture, moderately heavy, of a dull dead white, and rough, and ſomewhat duſty ſurface; it is tolerably ſoft to the touch, adheres firmly to the tongue, breaks not ſo eaſily between the fingers as moſt other Marles, and a little ſtains the hands; it melts freely in the mouth, and leaves not the leaſt grittyneſs between the teeth; and thrown into water, it ſends up a number of bubbles, with a hiſſing noiſe, and ſoon diſſolves into a fine powder.

The Microſcope ſhews it to be of a looſe texture, but free from all extraneous particles.

It ferments not at all with Aqua Fortis.

In the fire it acquires a purer white with very little change of texture; but in a very fierce one, becomes a greyiſh very foul glaſs.

It is found in many parts of England, as well as other nations; I have obſerv'd it in Leiceſterſhire, Yorkſhire, and Oxfordſhire in many places; it has not yet that I know of been us'd either in medicine or mechanics.

It is to be obſerv'd, that this Marle is here deſcrib'd as it is commonly found pure and free from extraneous mixtures of all kinds, but the laxity of its texture and its eaſy and perhaps frequent diffuſion and coaleſcence again in the Earth, ſubject it like the foregoing, to a multitude of various mixtures of extraneous matters; hence it has ſometimes ſand, fragments of Talc, and plates of Selenitæ lodg'd in it, and at others, Earths of different natures, and colours in ſmall quantities and ſcatter'd particles, from whence it acquires a browniſh, yellowiſh, or reddiſh hue: This is the Marle which is alſo frequently found contain'd in the cavities of flints and other ſtony nodules, and there as well as in the ſtrata is at times found thus impregnated with extraneous particles; its natural colour is, however, always the dull, dead white, already deſcrib'd.

The Microſcope will always ſhew the accidental mixture, to which it owes a different colour, or other variety, to be no part of the body itſelf, but ſomething accidentally immers'd in it.

In many of the Earths before deſcrib'd, the external reſemblance is ſo great, that all the experiments that cou'd aſſiſt their diſtinctions were neceſſarily apply'd to; among theſe, the running them into glaſs was no ſmall tho' no very eaſy one; thoſe which follow have all more open and obvious diſtinctions, and give no neceſſity of having recourſe to that tedious and difficult trial.

8. *Marga fungoſa candida durior Alkalina, quæ Calx Nativa quorundam & Gypſum Tymphacium. Theophraſti.*

Hard, fungous, alkaline, white Marle, call'd Native Lime and Tymphacian Gypſum.

This is a hard, dry and ſomewhat coarſe Earth; it never conſtitutes a ſtratum, but is generally found in the fiſſures and cavities of ſtrata of ſtone, and ſometimes lying looſe upon, or immediately under them; it is generally found in maſſes of two, three, or four inches diameter, of irregular ſurfaces, and generally flattiſh, it commonly has but very little moiſture about it, and is of a dead whitiſh colour, with ſome faint admixture of a greyiſh brown, is of a compact and more firm texture than the Earths in general of this claſs, breaks with a rough ſurface, is ſomething harſh to the touch, and adheres very firmly to the tongue, it is not eaſily broken between the fingers, nor does it at all ſtain the hands; it melts but ſlowly in the mouth, has a diſagreeable taſte, and leaves a conſiderable grittyneſs between the teeth; thrown into water, it makes a conſiderable bubbling and hiſſing noiſe, and has without burning the quality of making a cement like lime or plaiſter of Paris.

View'd by the Microſcope, it appears of an irregular ſpungy texture, and containing a large quantity of a whitiſh coarſe ſand.

It makes a very conſiderable effervescence with Aqua Fortis.

In the fire it acquires a clean and beautiful white.

It is found in ſome parts of England, and was long ſince well known to the antients; Mr. Moreton found it in Northamptonſhire, and I have ſeen it thrown out of the quarries of Mr. Allen near Bath; and near Goodwood in Suſſex, I once pick'd up a ſpecimen of it, quite pure and free from ſand, or other extraneous mixture, but this rarely happens to it; the antients knew it by the name of Gypſum Tymphacium, and us'd it about cloths, as Theophraſtus obſerves: Pliny confirms this, by ſaying, *Græcia pro Cimolia Tymphaico utitur Gypſo*; and that their Gypſum which they us'd on theſe occaſions had the quality of lime like this Earth, is alſo confirm'd by the remarkable accident recorded by Theophraſtus, of a ſhip taking fire from the heating of the Gypſum, among ſome cloaths that were in it on the accidental admiſſion of ſome wet; that author indeed, whoſe knowledge in the foſſil kingdom can never be enough admired, conſidering the time in which he liv'd, does not himſelf call this a

Gypſum but an Earth, obſerving only, that the people about Tymphæa and the neighbouring places, call'd it Gypſum, χρῶνται δὲ τῇ γῇ τυμφαϊκῇ πρὸς τὰ ἱμάτια, ϗ καλῦσι γύψον οἱ περὶ τυμφαίαν ϗ τὺς τόπυς ἐκείνυς. Ed. Noſtr. Pag. 148.

9. *Marga lævis Cretacea friabilis alba, quæ Melinum Plinii.*
Smooth, friable, chalky Marle, The Melinum of Pliny.

This is the Melinum Plin. L. 35. P. 684. Terra Melia Aldrov. Muſ. Met. 252. Agricol. 63. and the Terra Melia or Γη Μηλιας of Theophraſtus, Ed. noſtr. 142.

The Melian Earth of Dioſcorides and Galen is a ſubſtance of a very different kind, a true Tripela, and to be deſcribed hereafter among the bodies of that Claſs.

The Marle here to be deſcrib'd, and which was known and greatly eſteem'd in the earlieſt times of painting, is a fine white compact Earth, yet conſiderably light, and of a very proper texture for the painters uſe. It is frequently found forming a ſtratum near the ſurface of the Earth, commonly lying immediately under the vegetable mould. While in the Earth it is of a pure and fair white, not tough or viſcid, yet by the reaſon of the fineneſs of its conſtituent particles, moderately coherent, cutting evenly and regularly thro', and leaving a ſmooth ſhining ſurface like the finer Clays. When dry it becomes of a very pure white, of a cloſe, compact and even texture, and ſmooth but not gloſſy ſurface; it is very ſoft to the touch, adheres firmly to the tongue, is eaſily broken between the fingers, and ſtains the hands a little in rubbing; it melts readily in the mouth, and is perfectly fine, leaving not the leaſt grittyneſs between the teeth; thrown into water it makes a great bubbling, and loud hiſſing noiſe, and immediately after ſwells and breaks into a multitude of ſmall irregular ſhap'd fragments, and thence into a moſt fine powder.

View'd by the Microſcope it appears of a perfectly fine and equal texture, containing no extraneous matter.

It makes not the leaſt efferveſcence with Aqua Fortis.

In the fire it becomes of a pure white, without any remarkable additional hardneſs.

It is common yet in the iſland of Milo, formerly call'd Μῆλος, where the antients originally found it; and not only there but in almoſt all the adjacent iſlands. It is at preſent not us'd, but was once in great fame, having been the original white of the great painters of antiquity; I have had it try'd here to the ſame purpoſe, and find that it does not make ſo bright a white as the things now in uſe among the painters, but it ſeems not liable like them to turn yellow, and if ſo, wou'd be very well worth the conſideration of perſons in that buſineſs, eſpecially as it may be had in any quantities with no other coſt but that of carriage.

10. *Marga ſiccior, & pulverulenta, alba, Creta dicta.*
Chalk.

This is the Terra Creta nuncupata, Aldrov. Muſ. Met. 241. Creta Worm. Charlt. &c. Creta Plin. 718. and the Κρητικη γη of Galen and Dioſcorides.

It is an Earth ſo well known throughout the world, as to need but little deſcription: It is naturally of a pure white, and perfectly even texture, and diſtinguiſhes itſelf from the other Earths of this Claſs by its duſty ſurface, its hardneſs in the maſs, and its dryneſs and particular quality of ſtaining the hands; thrown into water it raiſes a great number of bubbles with a hiſſing noiſe, and ſlowly diffuſes itſelf into an impalpable powder.

The Microſcope ſhews it of a looſe, open and ſpungy texture.

It ferments more ſtrongly with Acids than any other Earth, and burns to lime.

It is found in all parts of the known world, and generally in great quantities, it varies extreamly in degrees of hardneſs and of purity; it frequently contains a yellowiſh and ſometimes a white ſand, and ſometimes, tho' very rarely, fragments of Spar and Selenitæ. I have ſeen it of all the degrees of white, and of all conſiſtences, from the ſoftneſs of the Lac Lunæ, to the hardneſs of abſolute ſtone; but in all theſe ſtates it maintains the ſame characters of hiſſing in water, fermenting with Acids, burning to Lime, &c. therefore is evidently the ſame body in all theſe degrees of hardneſs and purity. Specimens of theſe, as alſo of the various accidental colours, ſome of the other white Marles are liable to receive from the adventitious mixtures, are properly enough preſerv'd as varieties in cabinets, and make a pretty figure; but in a work of this nature can have no right to be more than barely mention'd, as accidental varieties of one and the ſame ſpecies of Foſſil.

Chalk is of many uſes in the ordinary affairs of life, and as a medicine deſerves perhaps the higheſt place among the Alkaline Abſorbents; the antients us'd it as the Chian and other Earths of this kind; and, as Galen informs us, were very well acquainted with it as a cleaner of ſilver veſſels. In medicine the ſame, Galen informs us, it was weaker or leſs efficacious than the Terra Chia; as this was the opinion of thoſe who knew and us'd both, and we are now well acquainted with the real virtues of Chalk, it ſhou'd ſeem ſurely worthy our enquiry to procure and try thoſe Earths, which perſonal experience and compariſon made them judge better and more efficacious.

Sect. II. The Blueiſh MARLES.

1. *Marga argillacea ſubcærulea.*
Blueiſh, clayey Marle.

THIS is an Earth of a ſomewhat looſe and incoherent texture, yet conſiderably heavy. While in the Stratum it is of a dead, duſky blueiſh colour, in many places variegated with lines and blotches of red, of a looſe and open texture and moderately moiſt; it does not cut ſo evenly with the ſpade as the clays, or leave ſo ſmooth a ſurface, but falls in looſe irregular pieces, ſeemingly as ſpungy in texture as the generality of the other Marles, but holding much more firmly together; and manifeſting a clayey as well as a marly diſpoſition, by a tenacity and viſcidneſs not found in the purer Marles; when dry it becomes of a denſe, hard texture, and pale blueiſh colour, generally vein'd or ſpotted with a red, not leſs pale than it appeared while moiſt in the ſtratum, of a rough, unequal ſurface, very ſmooth and ſoft to the touch, and ſcarce at all adhering to the tongue; it breaks with ſome difficulty between the fingers, and does not at all ſtain the hands; it melts very readily in the mouth into a kind of mucilaginous ſubſtance, and leaves a conſiderable quantity of a gritty matter between the teeth; thrown into water it occaſions a conſiderable bubbling, with a hiſſing noiſe, and immediately ſwells and crumbles into a multitude of ſmall pieces, and from them ſoon after into an impalpable powder.

The Microſcope ſhews it to be a very impure maſs of a looſe texture, the veins of red appear to be more compact, and of the Reddle kind; and both theſe and the general body of the maſs, are ſeen to contain a conſiderable quantity of a browniſh coarſe ſand.

It raiſes no efferveſcence with Aqua Fortis.

In the fire it burns to a pale browniſh maſs, ſtreak'd with a dark red, and of a conſiderable hardneſs.

It is dug in Yorkſhire, Northamptonſhire, Staffordſhire and Kent, and is found to be a fine manure for the leaner plough'd lands in thoſe counties.

2. *Marga cæruleo-fuſca friabilis.*
Blueiſh-brown, friable Marle.

This is a fine and pure Earth, of a looſe texture, and very light. While in the ſtratum it is of a deep, dull blueiſh brown colour, and ſhattery texture, and commonly very dry; it will not cut evenly thro' with the ſpade, but falls into flat pieces of ſmooth but not gloſſy ſurfaces; when dry it is of a ſomewhat paler colour, but ſtill of a blueiſh brown, of a looſe irregular texture, a ſmooth ſurface and remarkable light; it is ſoft to the touch, adheres very ſlightly to the tongue, is eaſily broken between the fingers, and does not at all ſtain the hands; it melts freely in the mouth, and is perfectly pure and fine, leaving not the leaſt grittyneſs between the teeth; thrown into water it makes a great bubbling and hiſſing noiſe, and ſwells in bulk, and almoſt immediately moulders away into a fine brown impalpable powder.

View'd by the Microſcope it appears of a laminated texture, and looſe ſpungy ſtructure, and is commonly ſeen ſpangled over with extreamly minute fragments of a glittering ſpar, every particle being either a regular parallellopiped, or ſomething very nearly approaching to that figure.

It raiſes a ſlight effervescence with Aqua Fortis.

In the fire it acquires a duſky reddiſh brown colour, and ſomewhat harder texture.

It is dug in Yorkſhire, Staffordſhire and Suſſex, and near London, and frequently is variegated with a reddiſh or yellowiſh Clay, and ſometimes has numbers of ſea ſhells embodied in it, many of the ſhells at Woolwich are held together by a ſmall quantity of this Marle.

It makes a good manure for paſture land.

3. *Marga cæruleo-fuſca duriſſima, quæ Marga Columbina Plinii.*
Stony blueiſh Marle.

This is the Marga Columbina, Plin. L. 17. p. 54.

It is the hardeſt and drieſt of all the Earths of this claſs. While in the ſtratum it is of a blueiſh aſh colour, often variegated with white, and ſometimes with red, of a dry rough ſurface and almoſt a ſtony hardneſs, and of a laminated or plated texture; it is not to be cut thro' with a ſpade, but the people are forced to work at it with pickaxes; when dry it appears of a rough but compact texture, and unequal ſurface. It is compos'd of a number of thin ſtrata laid evenly on one another, and is very heavy and of a ſtony hardneſs, it is rough to the touch, adheres ſlightly to the tongue, and does not at all ſtain the hands; it melts very difficultly in the mouth for an Earth of this claſs, and leaves a conſiderable grittyneſs between the teeth; thrown into water it makes a ſlight hiſſing noiſe, with a few bubbles, and after ſome time falls into a number of irregular ſmall plates or flakes, and from them after ſome more time into powder.

The Microſcope ſhews it to be a harſh and looſe ſubſtance, of a plated texture, and containing ſome plated fragments of Selenitæ, and a ſmall but very tranſparent and hard ſand of a very pale amber colour.

It makes no effervescence with Aqua Fortis.

In the fire it acquires a dull duſky red.

It is dug in Kent and in many parts of Staffordſhire, Northamptonſhire and other places; they uſe it as a manure but are forced to let it lie a conſiderable time, or elſe to break it on the ground with mallets before it will moulder and diffuſe itſelf.

Pliny mentions this Marle, with the particular character of its being equally good as a manure for plow'd fields and paſtures; he has before been obſerving that ſome particular Marles are fit for one, and ſome for the other of theſe uſes; but of this he adds, *hæc ex æquo fertilis.* He tells us that it was called alſo in France *Eglecopala,* a word which tho' Pliny expreſly declares to be of Celtic origin, *Galliæ ſuo Nomine Eglecopalam appellant*; yet there have not been wanting commentators who wou'd fain have it derived from the Greek πελεια, the blue pigeon. Hermolaus is clearly of this opinion, and imagines that they had this name, ſignifying a dove colour, originally from the Greek, and afterwards brought it into their own language; that this however, was the colour of the Earth is very evident from all accounts; and Pliny adds, a very good, tho' ſhort deſcription of it; he ſays it was rais'd out of the pits in great glebes like ſtone from the quarries, and that it afterwards moulder'd to pieces by the action of the ſun and froſts, and fell into thin flat plates. *Glebis excitatur Lapidum modo: ſole & gelatione ita ſolvitur ut tenuiſſimas Bracteas faciat.* p. 54. which is always the very caſe with ours when it breaks.

SECT. III. Yellow MARLE.

1. *Marga arenoſa lutea friabilis.*
Yellow, friable, ſandy Marle.

THIS is a looſe and very ſhattery Earth. While in the ſtratum it is of a deep ſtrong yellow, cruſtated or laminated, of a looſe crumbly texture, and very dry, it cuts thro' eaſily with the ſpade, but does not fall regularly but in ſhattery fragments, commonly broad and flat, and leaves a rough tho' plain ſurface behind it; when dry it is of a ſtrong and fair yellow, of a looſe friable texture, and conſiderable weight, and is compos'd of a multitude of thin cruſts, laid evenly on one another, and eaſily parting and ſliding one from the other, of a dry duſky ſurface, and ſpangled all over with ſmall flat glittering particles; it is rough and duſty to the touch, adheres firmly to the tongue, breaks very eaſily between the fingers, and ſlightly ſtains the hands; it melts freely in the mouth, and leaves a conſiderable quantity of gritty matter between the teeth: Thrown into water, it ſends up a number of bubbles, with a very ſmall hiſſing noiſe, and immediately falls into a fine looſe powder.

Before the Microſcope it appears a very beautiful object. It is compos'd of a multitude of thin plates, laid evenly together, and is of a porous ſpungy texture, full of a fine ſhining ſand, and a multitude of flat talcy particles, extreamly thin and of different ſhapes and bigneſs.

It raiſes no effervesſcence with Aqua Fortis.

In the fire it acquires a fine deep red colour, with very little change in its texture.

It is dug in many parts of Suſſex, and makes an excellent manure for heavy, ſtiff, clayey lands.

SECT. IV. The Red MARLES.

1. *Marga friabilis pallide rubeſcens.*
Friable, pale red Marle.

This is the Marga Saxatilis incarnata. Worm. 6. Charlt. Foſſ. 4.

It is a very pure and fine Earth, never forming a compleat ſtratum of itſelf, but always lodg'd in the cavities of ſtone, or perpendicular fiſſures of other ſtrata; it is of moſt fine, compact and cloſe texture, moderately heavy for an earth of its kind, and of a pale fleſh colour, or ſometimes of a deeper red; this colour is ſometimes univerſally diffus'd thro' the maſs, ſometimes diſpos'd in veins and ſpots thro' it, and ſometimes only cruſts over its outſide; it is of a fine, even, regular ſurface, ſmooth and ſoft to the touch, eaſily crumbling between the fingers, not at all ſtaining the hands, and pretty firmly adheres to the tongue; it melts very freely in the mouth, and leaves not the leaſt harſhneſs between the teeth: Thrown into water it raiſes a ſlight ebullition, and hiſſing noiſe, and after ſome time falls into ſmall lumps, and from them into a fine impalpable powder, which if ſtir'd up, hangs a long time ſuſpended in the water.

Examin'd by the Microſcope, it appears of a moſt fine, cloſe and compact texture.

It raiſes no effervesſcence with Aqua Fortis.

In the fire it burns to a pale browniſh red with a little additional hardneſs.

I have before obſerv'd, that the white Marle, Sect. I. Nº 6. is liable to accidental changes of colour, and ſometimes appears reddiſh, but that vitiated ſtate of that Earth is carefully to be diſtinguiſh'd from this genuine and peculiar ſpecies; they might poſſibly be miſtaken for one another at firſt view, but a cloſer inſpection and examination according to their ſeveral deſcriptions will abundantly diſtinguiſh them.

This is frequently found in Germany, Italy, and France, but no where in ſuch plenty as in the great Mine at Goſſelaer in Saxony. It is a good Aſtringent, and accounted a Sudorific, and good in peſtilential Fevers.

2. *Marga friabilis ponderoſa rubra.*
Red, friable, heavy Marle.

This is a very pure, weighty, friable Earth, of great value to the farmers, and is frequently found ſpotted and variegated with a blueiſh or greyiſh Earth of the ſame texture, and no way differing from the firſt of the blue Marles before deſcrib'd.

While in the ſtratum it is of a deep and ſtrong red, and with its variegations of blue, where it has them in any quantity, reſembles a handſome marble; it is of a crumbly texture, and commonly very dry; it cuts irregularly, tho' eaſily with the ſpade, and commonly falls in large rough pieces, of uneven ſurfaces. When dry it is of a very beautiful red, but much paler than while in the ſtratum; and the blueiſh Earth which makes its variegations, and which is blended among it in different quantities, becomes often almoſt white: It is of a ſhattery and friable texture, and rough unequal ſurface; it adheres very firmly to the tongue, is ſmooth and ſoft to the touch, eaſily breaks between the fingers, and does not at all ſtain the hands: It melts freely in the mouth, and leaves not the leaſt grittyneſs between the teeth. Thrown into water it makes a ſlight ebullition, with a little hiſſing noiſe, and preſently after ſwells and falls into a multitude of ſmall flattiſh pieces of different degrees of red and blueiſh, and thence breaks into an impalpable powder.

Examin'd by the Microſcope it appears of a looſe ſpungy texture, and irregularly laminated ſtructure.

It makes no effervefcence with Aqua Fortis.

It burns to a darker red with a conſiderable additional hardneſs.

It is dug in vaſt quantities in Kent, Dorſetſhire and Staffordſhire, and much eſteem'd by the farmers as a manure for what they call poor hungry land.

3. *Marga arenoſa friabilis ſordide rubens.*
Deep, duſky-red, friable, ſandy Marle.

This is a looſe lax Earth, of a very crumbly texture, and conſiderable weight, and like many other of the Marles, is frequently found variegated with the whitiſh, greyiſh, or blueiſh Earths of the ſame claſs.

While in the ſtratum it is of a deep blood red, variouſly mottled with a paler red, approaching to a fleſh colour, and frequently with other colours: It is moderately dry, and of a moſt looſe and crumbly texture, it cuts eaſily thro' with the ſpade, and leaves a ſmooth, but not gloſſy ſurface behind it, and is very apt to fall to pieces in digging; when dry, it is of a fine ſtrong, but duſky red, and variegated with paler colours, of a moſt looſe and incoherent texture, and rough uneven ſurface; it adheres very firmly to the tongue, is rough, dry and harſh to the touch, crumbles almoſt to powder between the fingers, and ſtains the hands; it melts very readily in the mouth, but leaves a great deal of harſh matter between the teeth: Thrown into water it raiſes a great ebullition and loud hiſſing noiſe, and ſwells in bulk, and quickly crumbles into looſe powder.

View'd by the Microſcope, it appears a looſe incoherent maſs, full of a ſmall whitiſh ſand.

It makes no effervefcence with Aqua Fortis.

In the fire it acquires a deep red colour with very little additional hardneſs.

It lies on or near the ſurface in vaſt quantities, in Penſilvania, Virginia, and other parts of America, and has been ſent over thence by John Bartran and others.

It has not yet been put to any uſe, but muſt make a good manure for tough clayey lands.

4. *Marga rubra duriſſima.*
Stony, red Marle.

This is a very firm, hard and dry Earth, and is extreamly valu'd by the farmers; while in the ſtratum it is of a very fine pale red, ſometimes variegated with white, and oftener with blue or aſh colour, of a dry and ſmooth ſurface, and very conſiderable hardneſs. It cuts thro' very difficultly with the ſpade, and in ſome places is too hard to be touch'd by it, and muſt be dug with pickaxes; when dry, it is very nearly of a ſtony hardneſs, of a ſmooth, equal and regular ſurface, and very heavy; it adheres firmly to the tongue, is ſoft and unctuous to the touch, is not to be broken between the fingers, and does not at all ſtain the hands; it melts very difficultly in the mouth, and leaves a little harſhneſs between the teeth: Thrown into water, it cauſes a conſiderable ebullition and hiſſing noiſe, and after about an hour, breaks into a multitude of thin flat pieces.

The Microſcope ſhews it to be a compact Earth, of an irregular laminated texture.

It raiſes no effervefcence with Aqua Fortis.

In the fire it acquires a deep red with a little additional hardneſs.

It is dug in Suſſex, Yorkſhire, Northamptonſhire, Staffordſhire, and other places, and makes a very good manure, but requires time to break in the weather.

5. *Marga ponderoſa rubra mollis, quæ Rubrica fabrilis authorum.*
Soft, heavy, red Marle, call'd common Reddle.

This is the ſubſtance commonly called in Engliſh Reddle, and is the Rubrica fabrilis, Merr. Pin. 218. Math. 1559. Muſ. Calc. 134. Dougl. Ind. 80. Rubrica Charlt. Foſſ. 10. Rubrica fabrilis Mollis Kentm. 8.

It is a looſe ponderous Earth, of a rare texture, and very friable; while in the ſtratum it is of a moderate conſiſtence, rather inclining to hardneſs and of a deep colour, it cuts eaſily thro' with the ſpade, and leaves a gloſſy ſurface; when dry, it is of a ſomewhat paler colour, tho' ſtill of a very good red, of a denſe and ſeemingly compact texture, but not firm or hard, of a ſmooth and ſomewhat gloſſy ſurface, ſoft to the touch, adhering firmly to the tongue, eaſily breaking between the fingers, and ſtaining the hands in touching it; it is of a rough auſtere taſte, is readily diffuſible in water, and melts freely in the mouth, but leaves a quantity of harſh particles between the teeth.

Examin'd by the Microſcope it appears of a rough, open texture, and is ſeen to contain a conſiderable quantity of a coarſe white ſand, and commonly ſome plated fragments of Selenitæ.

It makes no efferveſcence with Aqua Fortis.

In the fire it acquires a conſiderable hardneſs, without changing colour.

It is found in moſt parts of the world, the beſt in this kingdom is dug in Derbyſhire, whence the painters and druggiſts ſhops of London are ſupply'd.

It is of great uſe in colouring, and waſh'd and freed from the ſand, is too often ſold by our druggiſts, under the name of Bole Armenic.

6. *Marga indurata ponderoſa rubra.*
Red, heavy, indurated Marle.

This is the Rubrica fabrilis dura, Kentm. 8. Rubrica laminata Charlt. 10.

It is a much harder and drier Earth than the precedent; while in the ſtratum it is of a deep red colour, and firm dry conſiſtence, not cutting thro' evenly with the ſpade, but breaking into irregular maſſes of all ſhapes and ſizes, but generally flat; when dry it becomes of a much paler colour, is of a very regular, cloſe texture, and is ſeen to be compos'd of a number of thin Laminæ, lying cloſely upon one another, and very hard, of a rough unequal ſurface, adhering very firmly to the tongue, and not to be broken between the fingers, but a little ſtaining the hands; it is of an Aſtringent taſte, very readily diffuſible in water, and melts pretty eaſily in the mouth, leaving a grittyneſs between the teeth.

View'd by the Microſcope it appears of an irregular porous texture, and full of a ſmall yellowiſh ſand.

It raiſes no efferveſcence with Aqua Fortis.

In the fire it burns to a darker red, and conſiderable hardneſs.

It is dug in Lincolnſhire, Hampſhire and Suſſex, and us'd by the turners to mark with, but this it does not readily do, unleſs firſt wetted.

SECT. V. The Brown MARLES.

1. *Marga fuſca friabilis.*
Brown, friable Marle.

THIS is a looſe, light and crumbly Earth, and makes a very rich manure; while in the ſtratum it is moiſt, ſoft and friable, of a pale brown, ſometimes variegated with grey, and ſometimes with black, but moſt frequently quite unmixed and alone; it cuts eaſily but not regularly thro' with the ſpade, and leaves a ſmooth and ſomewhat gloſſy ſurface behind it; when dry, it is of a yet paler colour, of a much more crumbly texture and uneven ſurface, it adheres very firmly to the tongue, is rough, and ſomewhat dry and duſty to the touch, crumbles to powder between the fingers, and ſtains the hands; it melts freely in the mouth, but leaves a conſiderable grittyneſs between the teeth; thrown into water, it raiſes a great ebullition with a loud hiſſing, and immediately falls into a ſoft powder.

The Microſcope ſhews it to be of a moſt looſe and ſpungy texture, and containing a conſiderable quantity of a large yellowiſh ſand.

It makes no efferveſcence with Aqua Fortis.

In the fire it burns to a pale red, with little additional hardneſs.

It is dug in Suſſex, and makes a fine manure for graſs land.

2. *Marga cinereo fuſca mollis, quæ Cimolia Purpuraſcens, Smectis & Terra Saponaria authorum.*
Soft, greyiſh brown Marle, call'd Fullers Earth.

This is the Cimolia purpuraſcens. Offic. Math. 1392. Smectis ſeu Terra Fullonica Men. Pin. 218. Smectis ſeu Terra Saponaria Anglica. Worm. 4. Smectis ſeu terra Saponaria & Fullonica Charlt. 2.

It is a denſe, heavy Marle: while in the ſtratum, moderately dry, of a firm coherence and cloſe texture for an Earth of this Claſs; it cuts evenly thro' with the ſpade, and leaves a gloſſy ſurface behind, but generally falls into rude and irregular pieces; when dry, it is of an aſh colour'd or greyiſh brown in all degrees, from very pale to almoſt black, and generally has ſomething of a greeniſh caſt with it; it is very firm and hard, of a compact texture, and rough, and ſomewhat duſty ſurface, adhering ſlightly to the tongue, very ſoft to the touch, not breaking eaſily between the fingers, and not ſtaining the hands; it melts freely in the mouth, and has a little harſhneſs between the teeth; thrown into water, it makes no ebullition or hiſſing, but gradually ſwells in bulk, and falls into a fine ſoft powder.

Before the Microſcope, it appears of a looſe crumbly texture, and in ſmall thin pieces is a little tranſparent.

It makes no effervefcence with Aqua Fortis.

In the fire it acquires a pale reddiſh brown colour, and a ſtony hardneſs.

It is dug in Kent, Bedfordſhire, Surry, and ſome other parts of the kingdom, and is in many others where it is not yet known of; its úſe is too well known to need deſcribing here, and ſo great, that it deſerves to be ſought after in more parts of the kingdom.

SECT. VI. Green MARLES.

1. *Marga ponderoſa denſa cinereo vireſcens.*
Denſe, heavy, greeniſh Marle.

This is the Terra viridis Saponaria Kentm 2.

It is the moſt denſe and compact in its texture of all the Marles: while in the ſtratum it is of a deep greeniſh brown colour, moderately moiſt, and of a moſt even and ſmooth texture; it cuts regularly thro' with the ſpade, and leaves a ſmooth and gloſſy ſurface behind it; when dry it is of a paler colour, and has leſs greenneſs, is of a moſt firm and compact texture, and of a ſmooth, even, and polite ſurface; it adheres ſlightly to the tongue, is extreamly ſoft and unctuous to the touch, is not to be broken between the fingers, nor does at all ſtain the hands; it melts freely and readily in the mouth, and leaves not the leaſt grittyneſs between the teeth; thrown into water, it makes no bubbling nor hiſſing noiſe, but ſwells, and ſoon after falls into a fine looſe powder.

The Microſcope ſhews it to be of a moſt even, pure and regular texture, in ſome ſmall degree tranſparent when in thin pieces, and of a ſeemingly middle nature, between Fullers Earth and the Steatites.

It makes no effervefcence with Aqua Fortis.

In the fire it burns to a very pale brown, without the leaſt remainder of green, or the ſlighteſt tendency to redneſs.

It is dug in many parts of Germany, and us'd as Fullers Earth.

2. *Marga arenoſa friabilis vireſcens.*
Green, ſandy, friable Marle.

This is a very heavy Earth, of a lax texture: while in the ſtratum it is generally very dry, of a fine green colour, and ſhattery, it cuts eaſily thro' with the ſpade, but leaves a rough ſurface behind it, and generally crumbles into irregular ſmall lumps; when dry, it is of a deep duſky green, of a looſe crumbly incoherent texture, and rough uneven ſurface; it adheres very firmly to the tongue, is rough and harſh to the touch, eaſily crumbles to powder between the fingers, and does not at all ſtain the hands; it melts freely in the mouth, but has a very auſtere unpleaſing taſte, and leaves a coarſe matter gritting between the teeth; thrown into water, it makes a conſiderable ebullition with a ſlight hiſſing noiſe, and immediately moulders away into a looſe green powder.

View'd by the Microſcope, it makes a very pretty appearance, and is ſeen to be a very beautiful green Earth, full of a large coarſe white ſand.

It makes no effervеſcence with Aqua Fortis.

In the fire it acquires a duſky red colour, and conſiderable hardneſs.

It is found in many parts of England; I have obſerv'd it in Leiceſterſhire, Northamptonſhire, and Suſſex, as alſo about Hedgerly among the loam-pits, and on Hampſtead-Heath, where the late Dr. Woodward alſo found it; and from the quantity of ſand it contains, judg'd it a loam, and thought it ow'd its colour to a Vitriolum Martis, but its ready diffuſibility in water, and its not ſtriking a black with a ſtrong decoction of Galls, give no countenance to thoſe determinations; they us'd it in Suſſex as manure for clayey lands.

SECT. VII. The Black MARLES.

1. *Marga friabilis nigricans.*
Black, friable Marle.

THIS is a crumbly friable Earth, of a looſe texture, and very great weight; while in the ſtratum it is of a pure fine black, moderately moiſt, but of a ſhattery texture, cutting eaſily and evenly thro' with the ſpade, and leaving an even and gloſſy ſurface behind it, but apt to crumble into irregular pieces; when dry, it is of a deep but ſomewhat browniſh black, of a more cloſe texture than while in the ſtratum, and of a ſmoother ſurface; it adheres but very ſlightly to the tongue, is ſoft and ſmooth to the touch, eaſily breaks between the fingers, and does not at all ſtain the hands; it melts freely in the mouth, but leaves a little grittyneſs between the teeth; thrown into water, it makes a ſlight ebullition with a ſoft hiſſing, and readily breaks into a fine, ſoft, black powder.

View'd by the Microſcope, it appears of an even but coarſe texture.

It makes no effervеſcence with Aqua Fortis.

In the fire it burns to a dull browniſh red, with very little additional hardneſs.

It is thrown up frequently from about twenty or twenty five feet deep in the coal-pits when digging on Mendip-Hills; and I have ſeen of it among the rocks above Mount Sorrel in Leiceſterſhire, in the perpendicular fiſſures; it has not been put to any uſe that I have heard of, but ſeems as if it would prove a very rich manure; it carries a great reſemblance to the fineſt black vegetable mould.

Pliny gives the honour of the invention of manuring land with Marle, to this nation and France; after he has been naming ſeveral different kinds of manure for fertilizing land, L. 17. C. vi. he ſays, *Alia eſt ratio quam Britannia & Gallia invenere alendi eam ipſa; quod Genus Margam vocant*; but adds, that it was alſo known to the Greeks, whoſe enterpriſing ſpirit he has finely deſcrib'd in four words on this occaſion, *Quid enim intentatum illis?* and adds, that they us'd a white Earth, which they call'd Leucargillos on their wet cold lands: he mentions ſeveral kinds of Marle, the Alba, Rufa, Columbina, Argillacea, Tofacea and Arenacea; which probably were all the ſame with ſome of ours, tho' his deſcription of the third only can make that a certainty, for which reaſon I have not ventur'd to give the other names as ſynomyma to any of the ſpecies; he very well diſtinguiſhes the Marles in general, however, into two Claſſes, the fine, fat and ſoft, and the rough, the Aſperæ and Pingues; which are certainly very good diſtinctions, as the character they are founded on is obvious, and the proof of it, as he obſerves, plain to the touch, *experimenta utriuſque in manus*.

The ſmall number of diſtinct ſpecies of the Marles, made it not neceſſary to trouble the reader with this diſtinction here; but it may not be improper to obſerve, that from this and a multitude of ſimilar paſſages, it is plain, that the antients had very true notions about the diſtinctions of foſſile bodies; our only misfortune is, that they are ever too ſhort on theſe ſubjects.

SIMPLE EARTHS.

Order the Second.

Thoſe of rough, duſty ſurfaces, and a looſe texture.

SERIES I.

CLASS I. ORDER II. GENUS I.

OCHRES.

EARTHS ſlightly coherent, compos'd of fine, ſmooth, ſoft, argillaceous particles, rough to the touch, and readily diffuſible in water.

SECT. I. The Yellow OCHRES.

1. *Ochra leviſſima friabilis, pallidiſſime flaveſcens.*
Light, friable, pale yellow Ochre.

This is a very pure, elegant, and beautiful Earth, of an extreamly pale yellow, even paler than what we call brimſtone colour, of a middle degree, or between that and cream colour; of a looſe, lax, and crumbly texture, and compos'd of a multitude of very thin fine plates, or ſtrata, laid evenly and cloſely one upon another, and in nothing more remarkable than in its extream lightneſs; it is of an even but duſty ſurface, adheres very firmly to the tongue, is ſoft and ſmooth to the touch, eaſily crumbles between the fingers, and ſtains them with ſomething a little deeper than a cream colour; it melts freely in the mouth, and leaves not the leaſt grittyneſs between the teeth; thrown into water, it raiſes a great ebullition and hiſſing noiſe, but does not readily break in it of its own accord, tho' it is eaſily mixt with it on rubbing, and ſpreads and diffuſes finely in it.

The Microſcope ſhews it to be of a duſty looſe ſpungy texture, and finely laminated.

It makes no efferveſcence with Acids.

In the fire it ſeparates its flakes more widely, and becomes very crumbly, and of a dull reddiſh brown.

It is found in Penſylvania and Virginia, from which places it has been ſent over by John Bartran.

It is not at preſent known among the painters, but it is very much worth their being acquainted with; I have had it try'd both in water and oil, in both which it ſucceeds very well, making a pale ſtraw colour in the former, and a very agreeable tho' ſomething deeper yellow in the latter.

2. *Ocra ponderoſa dura pallide flaveſcens.*
Hard, heavy, pale yellow Ochre.

This is a very fine and beautiful Earth, and is much valued by the painters.

While in the ſtratum, it is of a fine bright yellow, ſomewhat hard and dry, and of a pretty firm and compact texture; it does not cut well with the ſpade, but is generally broke with pickaxes, and falls into irregular maſſes; when dry, it is of a pale but very bright and beautiful yellow, of a cloſe, compact, firm texture, conſiderably heavy, and of a ſmooth, even and polite ſurface for an Earth of this kind; it adheres very firmly to the tongue, is ſoft and ſmooth to the touch, does not eaſily break between the fingers, and ſtains the hands with a very fine light yellow; it melts freely in the mouth, and leaves no harſhneſs between the teeth; thrown into water it raiſes a conſiderable ebullition and loud hiſſing noiſe, but does not quickly break in it of itſelf, tho' when mix'd it ſpreads very finely.

View'd by the Microſcope, it appears of a ſomewhat more compact texture that the former, yet very looſe and ſpungy.

It makes no efferveſcence with Aqua Fortis.

In the fire it burns to a ſtony hardneſs and dull pale red colour.

It is dug in Germany, Saxony, France, and England; our painters are very fond of it as it makes a fine pale yellow; but if they were once acquainted with the American kind, this would loſe much of its value with them, as it is greatly inferior to that elegant Earth; they pretend to receive this Ochre from France, but in the way from Sherbourn to Bath, near Mendip-Hills, I ſaw people digging great quantities of it, which they told me were ſent to Briſtol, and thence to London for the colour ſhops; it lay at about 18 foot deep, in a ſtratum of a foot, or 15 inches thick; it mixes equally with water or oil. This and the other hard and ſomewhat ſmooth Ochres, evidently contain a ſmall quantity of a fine Clay intimately mixed with and inſeparable from them.

3. *Ochra leviſſima flava friabilis.*
Light, crumbly, yellow Ochre.

This is an Earth unknown to the painters, but well worth their being acquainted with; it is of a moſt looſe, lax and crumbly texture, of a ſomewhat paliſh but not bright yellow, extreamly light, and of a rough, duſty ſurface; it adheres firmly to the tongue, is ſoft and ſmooth to the touch, crumbles readily to powder between the fingers, and ſtains the hands with a fair but not ſtrong yellow; it melts freely in the mouth, and leaves not the leaſt grittyneſs between the teeth; thrown into water, it raiſes a ſmall ebullition, and makes a conſiderable hiſſing, but does not readily break in it.

View'd by the Microſcope, it appears of a looſe, open, ſpungy texture.

It raiſes no efferveſcence with Acids.

In the fire it burns to a very fair red.

It is frequently thrown out at the mouths of Chalybeat ſprings, and ſometimes from ſuch as are not manifeſtly impregnated with that metal, and often forms incruſtations on ſticks and other things in its way, in the manner of the Oſteocolla; it lies in great abundance at the mouth of a ſmall ſpring on the right hand ſide of Hampſtead-Heath, near the hedge parting it from the paſtures; it has not yet been us'd by the painters, but is very worthy the trying.

4. *Ochra levis aurea friabilis, quæ Ochra Theophraſti.*
Light, friable, gold colour'd Ochre, the Ochre of Theophraſtus.

This is the Ωχρα Theoph. Ed. Noſt. 184, it is a very fine Earth, and tho' not yet in uſe, makes an excellent and bright gold colour.

It never conſtitutes a ſtratum, but is ever found looſe in form of a ſmall natural nodule, 'tis of a very fine and ſtrong tho' not deep yellow, of a looſe ſhattery texture, and very light; it is of a rough, uneven and duſty ſurface, adheres very firmly to the tongue, is ſoft, fine and ſmooth to the touch, eaſily crumbles between the fingers, and ſtains the hands to a true gold colour; it melts freely in the mouth, and leaves not the leaſt grittyneſs between the teeth; thrown into water, it makes a great ebullition and loud hiſſing noiſe, but like the former does not of itſelf readily break or diffuſe in it.

View'd by the Microſcope it appears of a looſe, ſpungy, and duſty texture.

It makes no efferveſcence with Aqua Fortis.

In the fire it burns to a very elegant red, with a little additional hardneſs.

It is frequent among gravel, and in the perpendicular fiſſures of other ſtrata, in many parts of the kingdom, and is ſometimes found in the ſame places, encloſed in the ferrugineous cruſtated Geodes to be hereafter deſcribed; on Mendip hills it is common in the fiſſures of the ſtrata; and in a gravel pit on the right hand ſide of the Oxford road, about a mile from London, there is always great plenty of it, ſome in maſſes of four, five, or ſix ounces weight alone, and ſome contain'd in the bodies before mention'd, with which that pit abounds.

I remember alſo to have ſeen it in ſome places hanging to the ſides, and from the tops of old mines, or other cavities, ſomething reſembling rude Stalactitæ; which particular Dr. Woodward alſo obſerv'd of an Ochre probably the ſame, and mentions it, vol. 2. p. 1. Sp. a. 4. and not unfrequently in maſſes of three or four ounces weight, in beds of chalk. The before mentioned author deſcribes alſo another Ochre, as he eſteems it, which he had found in the ſame manner lodg'd in chalk, in very large quantity. I cannot take upon me to contradict any one's perſonal obſervation, but cannnot but remark, that wherever I have found pure Ochre in chalk, or encruſted on, or hanging from caverns, it has been always of this kind; no other that I have yet ſeen being liable to appear to us in ſo many ſhapes, and likely to miſlead us into the making two or three ſpecies of it, from its very different external appearance. Many other Foſſils there are, which may, on their firſt appearance, be apt to miſlead the obſerver in the ſame manner: but if they anſwer to all the teſts propos'd in theſe deſcriptions, in the ſame manner and degree one with another, a judicious examiner will never think them different ſpecies, becauſe of their being round, ſquare or flat; the matter of every ſpecies of Earth, when pure, muſt be for ever the ſame, the particular ſhape of them may be alter'd by a thouſand accidents.

It is as yet unknown to the painters, but I have had it try'd both native, as a yellow, and burnt as a red, and find it exceed all the Ochres they uſe in both theſe conditions; and as it may be had for going for, and that within half an hour's walk of London, I hope ſome of the gentlemen of that profeſſion will think it worth a tryal.

Theophraſtus Ed. Noſtr. 124. mentions Ochre as being frequently us'd in the place of Orpiment; the particular ſpecies was probably this, ſince none of them approach ſo much as this to the fine gold colour of Orpiment; and indeed the powder of this ſcarce differs at all in colour from that of the more common ordinary and cheap Orpiment of our colour ſhops, which is a particular that author alſo ſo long ago obſerved, Καὶ Ὤχρα ἀντ' Ἀῤῥενικοῦ, διὰ τὸ μηδὲν τῇ χρόᾳ διαφέρειν.

5. *Ochra crocea laminata levis, quæ Ochra Attica Dioſcoridis.*

Light, plated, Saffron-colour'd Ochre, the Ochre Attick of the antients.

This is another of the yellow Earths, eaſy to be had, and worthy the conſideration of the painters.

It is found at ſome times conſtituting a ſtratum of itſelf, at others lodg'd in the perpendicular fiſſures of other ſtrata, and in ſome places lying in looſe nodules among gravel. It is of a fine deep but bright yellow, like that which ſaffron gives to water, and ſometimes is found ſlightly ſpotted with red: it is of a ſoft, ſhattery, friable texture; and always compos'd of a multitude of Laminæ, or thin plates, laid cloſely on one another, and is remarkably light. It is of a rough, uneven, duſty ſurface, it adheres firmly to the tongue, is ſoft and ſmooth to the touch, eaſily breaks between the fingers, and ſtains the hands with a very glorious yellow; it melts freely in the mouth, and leaves no harſhneſs between the teeth; thrown into water it makes a violent ebullition, and loud hiſſing noiſe, but does not readily moulder away in it.

View'd by the Microſcope it appears of a looſe, ſpungy, duſty texture, but regularly and finely laminated.

It makes no efferveſcence with Aqua Fortis.

In the fire it burns to a duſky red, with no additional hardneſs.

It is common in Northamptonſhire, and Staffordſhire, and about London; I have had it try'd as a paint; when unburnt it makes a moſt beautiful yellow, either in water or oil, but wants what the painters call a body; burnt to a redneſs it does not ſucceed ſo well, the colour having no brightneſs.

As the former was probably the Ochre of Theophraſtus, this ſeems to have been that of Dioſcorides, which was alſo greatly in repute among the antient painters, and call'd from the place whence it was brought in greateſt quantities and purity, Ochra Attica. The deſcription of that ſubſtance left us by this author agrees with this ſpecies in every particular; he ſays, it was very light, yellow throughout, and of a fine ſtrong colour, and not gritty, or containing particles of ſtone, but brittle. All which are exactly the qualities of this ſpecies of Ochre.

This ſpecies Ochre, known to the painters among the antients under the name of Ochra Attica, became afterwards confounded with a ſubſtance extreamly different from it in every particular, the Sil Atticum of the antients, of which hereafter; Vitruvius evidently has miſtaken them for the ſame ſubſtance; and ſince his time many who cou'd not reconcile the Ochre to all the qualities mentioned of the Sil, yet have imagin'd that that ſubſtance was yellow, which is evidently erroneous: Cæſalpinus obſerv'd, that the Sil and Ochre ſeem'd to be different ſubſtances, and takes notice, that Pliny mentions them with different qualities, and allots different countries to them, *Videtur autem aliud intelligere Sil & Ochram, de Ochra enim inquit ex Juba, naſci in inſula maris rubri ſed inde non advehi ad nos, at de Sile alias regiones recenſet ex quibus habebatur Pigmentum neceſſarium ad Lumina & Umbras.* Thus far this author had learn'd to diſtinguiſh the Sil from the Ochre, but he concludes his account with a double error, not only miſtaking the Sil for a yellow, but erroneouſly judging it the Giallolino, hereafter to be deſcrib'd: And even quite miſtaking the origin of the Giallolino itſelf; which inſtead of a native yellow Ochre, he eſteem'd a factitious thing, a preparation of lead. Quod hodie arte paratur ex Plumbo uſto vulgoque Giallolinum appellatur. A yellow paint is indeed prepar'd from lead, by a ſlight calcination of ceruſs, and is now in uſe among the painters, under the name of Maſticot; the Giallolino they have alſo frequently in uſe, and diſtinguiſh it by the name of Naples yellow.

The ancients not only eſtem'd this as a paint, but had it in frequent uſe in external compoſitions in Inflammations, Tumours, *&c.*

6. *Ochra ponderoſa flava friabilis.*
Heavy, friable, yellow Ochre.

This is the common yellow Ochre of the ſhops; it is the Ochra Mer. Pin. 218. Ochra Anglica, Worm. 17. Ochra Nativa Calc. Muſ. 137. Ochra Foſſilis ſive nativa Crocei Coloris, Dougl. Ind. 64.

It is a denſe and ponderous Earth: while in the ſtratum it is of a deep yellow, moderately moiſt, and of a cloſe texture; it cuts evenly thro' with the ſpade, and leaves a ſmooth, but not gloſſy ſurface behind it; when dry it is of a much deader yellow than any of the before deſcrib'd, of a cloſe firm texture, and even, but duſty ſurface; it adheres firmly to the tongue, is ſoft and ſmooth to the touch, breaks tolerably eaſily between the fingers, and ſtains the hands with a duſky yellow; it melts freely in the mouth, and leaves no grittyneſs between the teeth.

Thrown into water it raiſes a conſiderable ebullition, with a ſlight hiſſing noiſe, and immediately ſwells in bulk, and moulders into a fine ſoft powder, as quick as the common fullers earth.

View'd by the Microſcope it appears of a very regular, but looſe, ſpungy texture.

It makes a conſiderable effervescence with Aqua Fortis.

It burns to a fine bright red with very little additional hardneſs.

It is dug in Buckinghamſhire, Somerſetſhire and Oxfordſhire, and is the yellow Ochre principally in uſe among the painters, tho' greatly inferior in value to moſt of thoſe before deſcrib'd.

7. *Ochra argillacea ponderoſa lutea dura.*
Hard, heavy, clayey, yellow Ochre.

This is a very denſe, compact and weighty Earth, and like ſome other of the more compact Ochres, has evidently ſome particles of a true fine Clay among it. While in the ſtratum it is of a very beautiful ſtrong yellow, of a cloſe compact texture, firmly coherent, and in ſome degree ſtiff or viſcid; it cuts eaſily and evenly thro' with the ſpade, and leaves a ſmooth and ſomething gloſſy ſurface behind it: When dry, it is of a very fine bright yellow, of a denſe, cloſe and compact texture, and a ſmooth, even and gloſſy ſurface; it adheres firmly to the tongue, is ſoft, ſmooth, and ſomewhat unctuous to the touch, is not eaſily broken between the fingers, and but ſlightly ſtains the hands with a fine pale yellow; it melts freely in the mouth, leaving no grittyneſs between the teeth: Thrown into water it makes a conſiderable ebullition, and hiſſing noiſe, and immediately ſwells in bulk, ſoon after breaking into a multitude of thin flaky pieces, and thence falling into a fine yellow powder.

View'd by the Microſcope it appears of a cloſe, compact, and very fine texture.

It makes no effervescence with Aqua Fortis.

It burns to a very fair red, with a conſiderable hardneſs, but crackles and burſts in the fire.

It is dug in Buckinghamſhire, Yorkſhire, and ſome other places, and ſometimes ſent up to London, and us'd by the painters. I have had it try'd both native and burnt, and find that it makes both ways a very good and uſeful colour.

8. *Ochra duriſſima ponderoſa flava.*
Stony, hard, heavy, yellow Ochre.

This is the hardeſt of all the Ochres. While in the ſtratum it is of a dead, duſky and ſomewhat deep yellow, very dry, and ſo hard as not to be cut with the ſpade, but muſt be dug with pickaxes, it breaks in the digging into rude irregular maſſes, of rough unequal ſurfaces, and very great weight; when dry it is of a ſomething paler and brighter colour, of a cloſe compact texture, and almoſt ſtony hardneſs, of a rough irregular ſurface, adhering very firmly to the tongue, and hard, harſh and dry to the touch, it is not to be broken between the fingers, and but ſlightly ſtains the hands; it melts readily in the mouth, and leaves no grittyneſs between the teeth; thrown into water it makes very little ebullition and no hiſſing noiſe.

View'd by the Microſcope it appears of a rough but very firm texture.

It makes no efferveſcence with Aqua Fortis.

In the fire it crackles a little, and burns to a fine florid red, with little or no change in its texture. It is evidently compos'd of an ochreous matter, lock'd up as it were in a conſiderable quantity of an indurated Clay, which ſo far prevails in the maſs as to keep it, tho' truly an Earth of this claſs, from exerting many of the properties which make the characters of it.

It is dug in Buckinghamſhire, Staffordſhire and Yorkſhire, but moſt plentifully about Oxford; whence it is conſtantly ſent in great quantities to London for the uſe of the painters.

9. *Ochra argillacea ſordide flaveſcens.*
Dull, duſky yellow, clayey Ochre.

This like the former, is an Ochre embodied in a conſiderable quantity of a true genuine Clay, and thence carrying many of the marks of that claſs of bodies; a few mix'd bodies of this ſort there will be in almoſt every claſs, ſuch has been the mixture of theſe things at their original coaleſcence, and theſe perplex the Genera they are plac'd among; all that can be done with ſuch, is, to claſs them among thoſe ſubſtances, the nature of which, from the ſuperior quantity of particles of that kind is predominant in them.

This is a denſe, compact and weighty Earth; while in the ſtratum it is of a duſky but not very deep yellow, of a ſtiff but ſomewhat crumbly texture, and is not to be cut thro' evenly with the ſpade, but falls into irregular maſſes; when dry it is of a ſomewhat paler, but duſky and unpleaſant colour; of a firm, compact, cloſe texture, and irregular but ſmooth ſurface: It adheres very firmly to the tongue, is ſmooth and unctuous to the touch, is eaſily crumbled to pieces between the fingers, and ſlightly ſtains the hands; it melts freely in the mouth, but has a little grittyneſs between the teeth; thrown into water it raiſes a ſlight ebullition, with a very ſmall hiſſing noiſe, and in a few minutes ſwells in bulk, and afterwards falls into ſmall plated fragments, and thence into a fine yellow powder.

View'd by the Microſcope it appears of a compact but ſomewhat duſty texture.

It makes no efferveſcence with Acids.

It burns to a very fine pale red, of an almoſt ſtony hardneſs, but is very apt to crackle and burſt in the fire.

It is to be obſerved, that this and all the other yellow Ochres, when firſt taken out of the fire, look of a deep, ruſty chocolate colour; but as they cool they become more and more red, and ſhew not their true colour till abſolutely cold.

This is found in Buckinghamſhire, Staffordſhire, Oxfordſhire and Northamptonſhire; and is ſometimes brought to London and ſold in the colour ſhops.

10. *Ochra argillacea luteo fuſca levis.*
Browniſh yellow, light, clayey Ochre.

This is another of the impure Ochres, but contains much leſs Clay than the precedent. It never forms a diſtinct ſtratum, but is found in detach'd pieces among other ſtrata, and ſometimes in the perpendicular fiſſures of them. It is of a pale browniſh yellow, but not a diſagreeable colour; of a ſmooth, even and perfectly fine texture, and plain and ſomething gloſſy ſurface, and very light; it adheres very firmly to the tongue, is dry but ſoft to the touch, breaks tolerably eaſily between the fingers, and but ſlightly ſtains the hands; it melts freely in the mouth, and leaves no grittyneſs between the teeth; thrown into water it raiſes a conſiderable ebullition and hiſſing, but does not of itſelf break or moulder quickly in it.

View'd by the Microſcope it appears of a cloſe, even and regular texture.

It makes no effervefcence with Aqua Fortis.

It burns to a dead duſky browniſh red.

It is found in Buckinghamſhire, Northamptonſhire and many other counties; and tho' not of ſo bright a yellow as many of the other Ochres, yet is a very pleaſing colour, and has what the painters call a good body; I have ſeen of it of particular fineneſs in the fiſſures, and among the rocks about mount Sorrell in Leiceſterſhire; and about London, it is frequently thrown up out of the clay and gravel pits in lumps of three or four ounces weight.

11. *Ochra ponderoſa friabilis aureo crocea, quæ Giallolino authorum.* *Heavy, friable, fine yellow Ochre, call'd Naples yellow.*

This is a valuable, and extreamly beautiful Earth. It is of a moſt bright and elegant colour, between what we call a gold and a ſaffron colour, of a very looſe, ſpungy, porous and ſhattery texture, and remarkably heavy; it is of a rough, uneven, ſpungy and duſty ſurface, it adheres but very ſlightly to the tongue, is rough and gritty to the touch, very eaſily crumbles between the fingers, and ſlightly ſtains the hands, breaks freely in the mouth, is of a manifeſtly ſaline taſte, and feels hard and harſh between the teeth; thrown into water it makes a great ebullition and hiſſing noiſe, and depoſits a ſmall quantity of fine yellow powder all about it, but does not readily moulder or crumble to pieces.

View'd before the Microſcope it appears of a moſt looſe, incoherent and ſpungy texture.

It makes a very briſk effervefcence with Aqua Fortis.

It burns to a deeper yellow but with no tendency to redneſs.

It is found in ſome parts of Italy, particularly about Naples, ſometimes on the ſurface of the earth, and ſometimes at conſiderable depths; much of it is brought thence for the uſe of the painters, who eſteem it a very fine colour.

The antients I have before obſerv'd at Nº 5. of this Section, were well acquainted with yellow Ochres as paints; 'tis plain from Theophraſtus alſo, that they well knew the method of making a red from them by burning: That excellent author has even given the exact proceſs, and aſcribes the invention of it to accident; as, wou'd the vanity of men allow it, moſt of the great inventions in the world have probably been owing to them.

The way of making it he tells us was this, they put the Ochre into new earthen veſſels which they cover'd with Clay, and ſet in furnaces; theſe as they grew hot, heated alſo the Ochre, and the greater the degree of fire was, the ſtronger red the matter acquir'd. The invention he ſays was Cydias's, who took the hint of it, as was reported, from obſerving in a houſe which was on fire, that ſome of the Ochre which was there when half burnt aſſum'd a red colour.

One wou'd be apt to imagine, that after ſo expreſs and plain an account as this, of this manufacture of the antients, there cou'd not well have been any errors about it among thoſe who wrote afterwards; but we find many authors of credit and reputation falling into ſtrange errors concerning it ſince. We ſee Pliny ſpeaking of it ſays, after he has been naming the Rubrica or Reddle, that Ochre was made from it by burning; not that it was made from Ochre, and that the more it was burnt the better it was; *ex ea fit Ochra, exuſta rubrica in ollis novis luto circumlitis quo magis arſit in Caminis hoc melior.* One wou'd wonder that ſuch an account as this, ſo plainly contradicting not only the antient fathers of knowledge, but even reaſon and common experience alſo, and which every painter's boy muſt have been able to laugh at, cou'd have a place in a work generally thought of much credit: But what is much more wonderful in regard to it, is, that ſuch is the zeal of propagating errors in natural knowledge, as I have elſewhere had occaſion to obſerve, that tho' the antients contradicted this aſſertion, and common experience prov'd it falſe every day, yet Iſidore Lib. 19. Cap. 7. and Cardanus L. 5. have repeated and avow'd it almoſt in the ſame words.

I have had occaſion to obſerve in Pliny ſo many inaccuracies, and careleſs tranſlations from Theophraſtus particularly, that I am far from thinking it impoſſible that he might have originally given us this paſſage as it now ſtands. Salmaſius however, is good natur'd enough to attempt an emendation of the text, and imagines it ought to ſtand thus, *Ochra, ex ea fit exuſta Rubrica & fit ex Ochra exuſta in ollis novis luto circumlitis.* It is eaſy to ſee that Pliny's account is a tranſlation, ſuch as it is, from

Theophraſtus; but I don't know whether the critics will allow ſo bold an emendation as this. If we may have leave to undertake all the errors of Pliny in this manner, and be permitted to make him ſay exactly the contrary to what he does ſay, we may certainly ſoon make him one of the beſt authors in the world.

SECT. II. The Red OCHRES.

1. *Ochra rubra friabilis ponderoſa, Sil Syricum Antiquorum.* *Friable, heavy, red Ochre, The Sil Syricum of the Antients.*

THIS is an earth of ſmall price with us, but of great uſe among the painters. It is of a looſe, irregular texture, and of a fine colour and great weight; while in the ſtratum it is moderately moiſt, cuts eaſily but not evenly thro' with the ſpade, leaves an irregular ſurface behind it, and generally falls in rude maſſes; when dry it is of a fine ſtrong red, of a looſe friable texture, and very rough and duſty ſurface: It adheres very firmly to the tongue, is ſomewhat ſoft to the touch, crumbles eaſily between the fingers and ſtains the hands; it melts freely in the mouth, has a ſtrong aſtringency to the taſte, and leaves a very conſiderable grittyneſs between the teeth; thrown into water it raiſes a great ebullition with a conſiderable hiſſing noiſe, and immediately moulders into a fine ſoft powder.

View'd by the Microſcope it appears of a looſe crumbly texture, and is ſeen to contain a conſiderable quantity of a ſmall, pale yellow ſand.

It makes no efferveſcence with Aqua Fortis.

In the fire it crackles a little, and acquires a conſiderable additional hardneſs and much paler colour.

It is dug in many parts of Wiltſhire, Dorſetſhire and Somerſetſhire, and ſent to Briſtol, from whence the colour ſhops in London are ſupply'd with it. I have ſeen of it alſo in Lincolnſhire, Northamptonſhire and Buckinghamſhire, but ſeldom pure.

It is much us'd in painting, eſpecially about the coarſer works, tho' it is poſſible to make a colour from it fine enough for the moſt elegant.

2. *Ochra purpurea friabilis Alkalina, Almagra Recentiorum, Sil Atticum Antiquorum.* *Friable, purple, alkaline Ochre, the Almagra of the Moderns, and Sil Atticum of the Ancients.*

This is an Earth of a very fine colour, of a looſe, lax texture, and great weight; while in the ſtratum it is of a fine deep purple, of a friable but very denſe, and ſeemingly compact texture, cutting unevenly with the ſpade and tumbling away in large rough maſſes.

When dry it is of a ſomewhat paler colour than while in the ſtratum, but of a fine and very deep red, of very conſiderable weight, of a denſe, compact, but yet very friable texture, and rough duſty ſurface. It adheres very firmly to the tongue, is dry and ſomething harſh to the touch, very eaſily crumbles between the fingers, and ſtains the hands; it melts freely in the mouth, is of a very ſtrongly aſtringent taſte, and leaves a little grittyneſs between the teeth; thrown into water it raiſes a ſlight ebullition, but without any hiſſing, and gradually ſwells in bulk, afterwards falling into a number of ſmall flat pieces, and thence into a fine purple powder.

View'd by the Microſcope it appears of a very fine and even texture, but full of a very gloſſy, pale browniſh ſand.

It makes a violent efferveſcence with Aqua Fortis.

In the fire it acquires a much paler colour, without any change in its texture.

It is found in immenſe quantities in many parts of Spain: in Andaluſia there are in a manner whole mountains of it. It is us'd in painting, and as an Aſtringent, with very good ſucceſs.

This ſeems to have been the Sil Atticum of Pliny, which he deſcribes to be a kind of mud or earth. *Sil proprie limus eſt, Optimum ex eo quod Atticum vocatur.* The antients had three kinds of Sil; the Atticum, the Marmoroſum, and the Syricum. The Attic was accounted the beſt, the Marmoroſum the next, and the other was leſs valued as of a more duſky colour. All accounts ſeem to make the ſubſtance here deſcribed the Attic kind. And the Sil Marmoroſum Salmaſius imagines to have been the ſhining red arenaceous Cinnabar of Theophraſtus. That great Critic wou'd have this word written Marmoriſum; and deduces it from the μαρμάριζον of the Greek; which he would have here expreſs, a ſand of a glittering appearance like marble. And then declares it not badly expreſſes what Theophraſtus calls the ſhining ſand, which was his Cinnabar. *Marmoriſum a marmoris nitore quaſi marmorea Arena, quæ non male refert* τὴν λαμπυρίζουσαν ἄμμον. Theophraſti. And adds, *Nec differebat color Silis & Minii.*

With all due deference, however, to the character of that excellent writer, I cannot but look on all this as a very unwarrantable conjecture, and forc'd conſtruction. Pliny could never mean to give his readers any idea of ſand, by the epithet Marmoroſum. And had the ſubſtance he meant to deſcribe been a ſand, or any thing in that form, wou'd certainly have mention'd ſo particular a circumſtance. I rather choſe to underſtand the Marmoroſum of that author, as ſignifying according to its plain conſtruction a ſubſtance in hardneſs, texture, and ſubſtance reſembling marble: And as I am well acquainted with a red Ochre of that nature and texture, which is hereafter to be deſcrib'd under the name of Ochra ſaxea rubra, make no doubt but that was the Sil Marmoroſum of Pliny; and am ready to believe, that had this excellent critic ever happen'd to ſee this ſubſtance, or know that there was ſuch a ſubſtance in the world, he wou'd have been of the ſame opinion, and ſav'd himſelf the forc'd conjecture before mention'd: The laſt kind or Syricum, which was hitherto generally printed Scyricum, but which father Hardouin has reſtor'd to its true reading, was probably the Ochra rubra friabilis ponderoſa, deſcribed before.

This Gentleman, however, who deſerves greatly of the learned world for his edition of that author, has been led into the error of confounding the Sil Atticum, and Ochra Attica with one another; which is not to be wonder'd at as ſo many authors of credit had done it before, and this particular part of natural hiſtory does not appear to have been the peculiar ſtudy of that editor.

3. *Ochra purpurea ponderoſiſſima dura.*

Hard, heavy, purple Ochre.

This is the Terra Perſica. Lem. Ind. 541. and is commonly call'd Indian red among the painters.

It is a very fine purple Earth, of firm, compact, hard texture, and great weight; while in the ſtratum it is of a pure blood colour, and almoſt of a ſtony hardneſs; it is not to be cut by a ſpade, but is dug with large iron crows, and falls in great irregular maſſes; when dry it is of a fine glowing red, extreamly heavy and of a very great hardneſs, of a rough duſty ſurface, and when broken full of conſiderably large, ſolid, bright, glittering particles, theſe are white; and of a fine luſtre, and pretty equally diſpers'd thro' the whole maſſes of this Earth, but do not ſhew themſelves on the ſurface, becauſe of a looſe powder which that is always cover'd with; it adheres very firmly to the tongue, is rough and harſh to the touch, is not to be broken between the fingers, and very deeply ſtains the hands; it melts ſlowly and difficultly in the mouth, and is of a rough, auſtere and very aſtringent taſte; thrown into water it makes a conſiderable ebullition with a ſlight hiſſing noiſe, but does not readily diffuſe or break in it.

View'd with the Microſcope it appears of a looſe, harſh texture, and the ſhining particles are very evidently ſeen to be fragments of a fine hard Spar; they are of different ſizes, but always approaching to a rhomboidal figure, generally of a pure white, but ſometimes faintly colour'd with green or yellow, and, which is ſomething odd, never that I obſerv'd with purple.

It makes a very conſiderable effervescence with Aqua Fortis.

In the fire it burns to a greater hardneſs with very little change of colour.

It is dug in the iſland of Ormuz in the Perſian gulf, and thence diſpers'd over all the Eaſt-Indies; twice I have receiv'd this Earth from Bombay, with accounts of its being dug there; but ſuppos'd them erroneous, till about ſix months ſince, I receiv'd a third parcel of it by the hands of Mr. Smyth, who aſſures me, that he has ſeen the place. It is us'd greatly in painting, but not in medicine.

4. *Ochra friabilis floride rubeſcens.*
Bright red, friable Ochre.

This is alſo an Earth much eſteem'd in painting in many parts of the world, but leſs known in England than other European nations.

It is of a fine, bright, florid red, of a denſe, compact yet friable texture, and moderately heavy; of an even but duſty ſurface, ſmooth and ſoft to the touch, and adheres very firmly to the tongue; it eaſily crumbles between the fingers, and readily ſtains the hands; it melts but ſlowly in the mouth, and is very fine, leaving ſcarce any harſhneſs between the teeth; thrown into water it raiſes a conſiderable ebullition with a ſlight hiſſing noiſe, and moulders into a fine red powder.

View'd by the Microſcope it appears of an even, ſmooth texture, and containing a very ſmall quantity of an extreamly fine ſand, of a pale brown colour, with a ſlight bluſh of reddiſhneſs, not unlike one of the Hampſtead heath ſands, to be deſcrib'd hereafter.

It raiſes a very ſtrong efferveſcence with Aqua Fortis.

It ſuffers very little alteration in the fire.

It is dug in vaſt quantities in the country above Bengall, and us'd in France and Germany as a fine red in painting; it is but little known in England, but I believe wou'd prove, if our painters wou'd give it a trial, at leaſt equally good with any red Earth they have in uſe.

5. *Ochra friabilis pallide rubeſcens, quæ Bolus Veneta vulgo.*
Pale red, friable Ochre, called Venetian Bole.

This is an Earth univerſally known and greatly eſteem'd among painters. While in the ſtratum it is of a fine bright red, moiſt as the ſofter of the clays, but not ſtiff or viſcid; it cuts eaſily and evenly thro' with the ſpade, leaves an even but not gloſſy ſurface behind it, and falls in ſomewhat compact maſſes; when dry it is of a fine bright but very pale red, in compariſon of the Ochres before deſcrib'd, and ſomething approaches to the colour of red lead, moderately heavy, of an even, and ſmooth, but not very firm texture, and of a duſty ſurface. It adheres firmly to the tongue; is ſoft, fine and ſmooth to the touch, pretty eaſily crumbles between the fingers, and very much ſtains the hands; it melts very freely in the mouth, has a little aſtringency in taſte, and leaves a ſlight grittyneſs between the teeth; thrown into water it raiſes very little ebullition, and that without any hiſſing noiſe, and ſlowly moulders into ſmall lumps and thence into powder.

View'd by the Microſcope, it appears of a duſty, rough texture, and full of a fine yellow ſand.

It makes no efferveſcence with Aqua Fortis.

In the fire it burns to a conſiderable hardneſs and deader colour.

It is dug in Carinthia, and is ſent from Venice into all parts of the world, being univerſally known as a paint.

6. *Ochra friabilis levis pallide rubeſcens alkalina.*
Light, friable, alkaline, pale red Ochre.

This is a very fine and valuable Earth, at preſent unknown in painting, but very eaſy to be had, and worth the bringing into uſe.

While in the ſtratum it is of a very pale but bright red, and of a looſe incoherent texture; it cuts eaſily thro', but leaves a rough ſurface, and falls in irregular pieces; when dry, 'tis of a very elegant pale red, much like that of the Venetian Ochre, but brighter and ſomething paler; it is very remarakbly light for an Earth of this kind, and of a looſe crumbly texture; it is of an even but duſty ſurface, it adheres ſlightly to the tongue, eaſily breaks between the fingers, and ſtains the hands; it melts freely in the mouth, is of a ſub-aſtringent taſte, and leaves very little hardneſs between the teeth; thrown into water, it makes a conſiderable ebullition and hiſſing noiſe, and preſently falls into a fine ſoft powder.

Examin'd by the Microſcope it appears of a ſmooth even texture, but perfectly pure; no glaſs I could ever uſe, being able to diſcover what were the few hard particles it contain'd.

It makes a very briſk effervеſcence with Aqua Fortis.

In the fire it burns to a duller colour, with very little additional hardneſs.

It was thrown up in digging after an imaginary gold mine in Florida, near the ſhores of the gulf of Mexico ſome years ſince; it lay there very deep, but probably is in many other parts of America, and eaſier to be come at; it has not yet been known in painting, but I have had it try'd, and find it a very valuable and elegant colour.

7. *Ochra argillacea pallidiſſime rubeſcens.*
Pale, Red, Clayey Ochre.

This is a Clayey Ochre of a conſiderable weight, but of a looſe friable texture; it is of a very pale red, approaching to what we uſually call a fleſh colour, of a looſe rough texture, and uneven, irregular, but not duſty ſurface; it adheres very firmly to the tongue, is ſmooth and unctuous to the touch, breaks very eaſily between the fingers, and ſlightly ſtains the hands; it melts readily and freely in the mouth, is inſipid to the taſte, and leaves a great harſhneſs between the teeth; thrown into the water, it makes a very conſiderable ebullition with a loud hiſſing noiſe, and immediately falls into a fine ſoft powder.

View'd by the Microſcope, it appears of a looſe, ſpungy texture, and full of a large coarſe white ſand.

It makes no effervеſcence with Aqua Fortis.

In the fire it burns to a very fair red, without any additional hardneſs.

It is common in Penſylvania and Virginia, and has been ſent from both thoſe places by John Bartran; it is yet made no uſe of, but wou'd ſerve all the purpoſes of the Derbyſhire Reddle before deſcrib'd.

8. *Ochra puriſſima levis purpuraſcens.*
Fine, light, purple Ochre.

This is an Earth very worthy the attention of the painters; it never conſtitutes a ſtratum of itſelf, but is found in the perpendicular fiſſures and horizontal cavities of thoſe of harder matter; it generally lies in theſe in lumps of uncertain figures, and from two to ſix ounces in weight; it is of a very fine purple in colour, of a moſt ſmooth, even and regular texture, and remarkably light; it is of an even, but ſomewhat duſty ſurface, adheres very firmly to the tongue, crumbles eaſily between the fingers, and ſtains the hands with a bright blood colour; it melts freely in the mouth, and is perfectly pure, leaving not the leaſt grittyneſs between the teeth, and is of a ſtrongly aſtringent taſte; thrown into water, it makes a ſlight ebullition without noiſe, and does not of itſelf readily moulder away into powder.

View'd by the Microſcope, it appears of a moſt even, fine and pure texture.

It makes no effervеſcence with Aqua Fortis.

In the fire it acquires a ſomething paler colour, without the leaſt additional hardneſs.

It is common in the perpendicular fiſſures of the ſtrata, where there is iron ore, I have ſeen it in Suſſex, about Briſtol, and in great quantities in the foreſt of Dean in Glouceſterſhire; it is not much known among the painters, tho' from the laſt place a conſiderable quantity is at times ſent to London; one or two of the colourſhops ingroſs it to themſelves, and ſell it under the name of Indian red, to which it is at leaſt equal in colour, and much ſuperior in the fineneſs of its particles, as all Earths found in the perpendicular fiſſures, muſt greatly excel thoſe of the ſtrata in this particular.

9. *Ochra purpurea puriſſima ponderoſa, quæ Rubrica Sinopica Antiquorum.*
Fine, heavy, purple Ochre, called Rubrica Sinopica.

This is the Rubrica Sinopica Math. 1359. Rubrica Sinopis. Agric. 583. Terra Sinopiana Tourn. Voy. Vol. 2. 159. Rubrica Sinopica Cæſalp. 35. Sinopis. Plin. L. 2. p. 685.

The Μίλτος Σινοπικὴ. Theophraſt. Ed. Noſtr. 126.

It is a very pure, fine and valuable Earth, and very worthy the attention both of the painters and the phyſicians.

It is a cloſe, compact and very weighty Earth, of a fine glowing purple colour, but in ſome ſpecimens much deeper than in others, and in ſome degenerating into paleneſs, but even in its worſt condition a very fine colour; it is of a pure texture, but not very hard, of an even but duſty ſurface; it adheres firmly to the tongue, is perfectly fine and ſmooth to the touch, does not crumble nor eaſily break between the fingers, and ſtains the hands; it melts very ſlowly in the mouth, and is perfectly ſmooth and fine, of a very auſtere aſtringent taſte, and leaves not the leaſt grittyneſs between the teeth; thrown into water, it makes a conſiderable ebullition with a loud hiſſing noiſe, and ſoon falls into a very fine purple powder, which readily diffuſes itſelf thro' a vaſt quantity of water.

View'd by the Microſcope, it appears of a cloſe, compact, even texture.

It makes a conſiderable efferveſcence with Aqua Fortis.

In the fire it burns to a great hardneſs, without change of colour.

It is found in the perpendicular fiſſures of the ſtrata of ſtone, and among iron ores, ſometimes lying at great depths, and ſometimes up to the ſurface, and that in many different places; in England indeed I cannot ſay, that I have yet had the fortune to find it, but am very apt to believe it is not wanting here: Tournefort imagines, that it was formerly found about the city of Sinope, from which it had its name, but I find no account of any ſuch thing; Theophraſtus expreſſly ſays, that it was a Cappadocian Earth, tho' call'd Sinopic, becauſe the city of Sinope was the mart for it, the principal place where it was carried for ſale, Καὶ ἣν καλοῦσιν Σινοπικήν· αυτη δ' ἐςίν ἡ Καπαδοκική· κατάγεται δεις Σινόπην. Ed. Noſtr. 126. which ſeems to imply very plainly, that it never was dug any where about Sinope at all: Pliny imagines indeed, that it was originally found in Pontus, but none of the antients bear him out in this; Dioſcorides, who was well vers'd in the hiſtory of the Materia Medica of his time, and who liv'd at a time when it was even more us'd than in the days of Theophraſtus, agrees perfectly with that author, as to the place where it was produc'd, affirming that it was taken up in Cappadocia from certain caverns, and carried to the town of Sinope, and there ſold.

Cappadocia ſeems therefore to have been the only place where this Earth was dug in the times of the earlier writers; afterwards, however, according to Pliny, it was found in Ægypt, Africa, and the Inſulæ Baleares, our Majorca and Minorca; *Naſcitur & in Ægypto Balearibus Africa,* L. 35. p. 685. Vitruvius alſo aſſigns it the ſame places, and I have of late receiv'd it from the New Jerſeys in America, where it is well known by the name of Bloodſtone, probably from its ſtaining the hands, and very probably it may be had in many other places; and this indeed deſerves enquiring thoroughly into, ſince perhaps there is not one among the Earths that is more worthy notice: its being form'd in the perpendicular fiſſures of the ſtrata makes it neceſſarily of extream fineneſs, as no particles but ſuch as were ſo, cou'd find their way thither; there may indeed be poſſibly ſtrata of an Earth like it, but theſe muſt afford it in much worſe condition; and this Pliny has very well remark'd, declaring that to be the beſt which was found adhering to ſtone; *Quæ ſaxis adhæſit excellit,* that is, ſuch as was found in the perpendicular fiſſures.

This fine texture and its high florid colour, muſt make it very valuable to the painters, and its great aſtringency with the ſame advantages, equally ſo in medicine; the antients were well acquainted with it as an aſtringent, in Fluxes and Hæmorrhages of all kinds, and I can from experience warrant its poſſeſſing the ſame virtues yet, and that in a very eminent degree: I have always obſerv'd, that the deeper colour'd was the moſt aſtringent, and indeed the pieces of it that are paler are but ſcarce, and in ſmall quantities, and not worth notice; the antients who had them more plentifully, when they conſider'd it as a colour, were indeed more careful about theſe varieties, and made three diſtinct ſpecies of it, the one a deep red, another of a pale, and as it were whitiſh colour, and the third of a middle degree between the other two; this laſt, the painters, according to Theophraſtus, ſeem to have been moſt fond of, and to have us'd alone, whereas they mix'd the other two together always to bring them to a colour proper for their uſe. Ἔςι δὲ αὐτῆς γένη τρία ἡ μὲν ἐρυθρὰ σφόδρα, ἡ δὲ ἔκλευκος, ἡ δε μέση, ταύτην αὐτάρκη καλοῦμεν διὰ τὸ μὴ μίγνυσθαι, τὰς δὲ ἑτέρας μιγνύουσι. Th. Ed. Noſt. 128.

But tho' this was the caſe in regard to the painters; in medicine it was quite otherwiſe, for that uſe they eſteem'd none but the fine genuine purple, and that Dioſcorides has excellently deſcrib'd, and left us no room to doubt whether the ſubſtance here mention'd were the ſame; he ſays, it was of a cloſe compact texture, weighty, of a liver colour, perfectly clean, and free from ſtones, when broken, every where equally deep colour'd, and when diluted with water, ſpreading and diffuſing itſelf abundantly: and exactly ſuch as this is the Earth here deſcribed.

12. *Ochra argillacea indurata rubra, quæ creta rubra authorum.* *Indurated clayey Ochre, called Red Chalk.*

This is a very denſe compact Earth, and much us'd by painters and other artificers.

It is of a fine, even and firm texture, very heavy, of great hardneſs for an Earth of this kind, and of a pale red, not much deeper than that of red lead on the outſide, but when broken, it is of a deep duſky liver colour within; it is of a very even and regular, but ſomething duſty ſurface, it adheres firmly to the tongue, is ſoft, ſmooth and unctuous to the touch, is not to be broken between the fingers, and readily ſtains the hands; it melts very freely in the mouth, is perfectly inſipid to the taſte, and leaves not the leaſt grittyneſs between the teeth; thrown into water it makes no ebullition or noiſe, and does not readily diffuſe or moulder to pieces in it.

View'd by the Microſcope it appears of a coarſe, open, ſpungy texture.

It makes no efferveſcence with Aqua Fortis.

It burns to a ſomething deader red, with a very conſiderable additional hardneſs, but is very apt to crackle and burſt in the fire.

It is dug in Germany, Italy, Spain and France, but in the greateſt quantity in Flanders; in England I have not yet obſerv'd or heard of it. It is not us'd in medicine, but is in great eſteem among artificers of many kinds, for its colour and firmneſs.

13. *Ochra ſaxea rubra, quæ Sil marmoroſum antiquorum.* *Red, ſtony Ochre, the marbly Sil of the antients.*

This ſeems to be the Earth mentioned by Dr. Woodward, Vol. 2. p. 3. of foreign Foſſils, under the name of ſtone colour, or fineſt red Earth from the Eaſt Indies.

It is the hardeſt and drieſt of all the Ochres; while in the ſtratum it appears abſolutely ſtony, forms thin, flat, regular ſtrata, and is to be dug with pickaxes; it naturally breaks into irregular, but flattiſh pieces, being of an obſcurely and irregularly laminated ſtructure; when dry, it is of the ſame conſiſtence as while in the earth, of a fine purpliſh red colour, very heavy, and containing a multitude of fragments of a fine lead ore of the diced kind, as they are uſually call'd, which are of a bright blueiſh colour, and make a very pretty appearance; beſide theſe, it has generally a ſmall quantity of pure native cinnabar; and both theſe ſubſtances are ſo equally mix'd with it, that it is impoſſible to break off a piece from the ſtratum of an inch ſquare without them; it is very heavy, of a coarſe but firm texture, of an unequal but duſty ſurface, and ſomewhat rough to the touch; it adheres very firmly to the tongue, is not to be broken without the help of a hammer, and very readily ſtains the hands; thrown into water, it makes a ſlight ebullition and hiſſing, and, if ſuffer'd to remain a long time in it, moulders to pieces; it is very hard in the mouth, but will in time melt wholly in it, and is of an auſtere aſtringent taſte.

View'd by the Microſcope it appears of an irregular rough texture, and ſhews a multitude of ſpangles of the lead and cinnabarine kind, too ſmall to be viſible to the naked eye.

It makes no efferveſcence with Aqua Fortis.

It burns to a fine red, and greater hardneſs.

I have had it try'd as a paint, and find it is known among the painters by the name of Indian ſtone red, and makes a noble colour; there is alſo much reaſon to think it wou'd be worth working for Mercury, three ounces of it having yielded me two drams and a ſcruple of pure quickſilver.

There are ſeveral conſiderable ſtrata of it on the borders of China; the Chineſe and Indians both uſe it as a paint, and a little of it is ſometimes brought over hither, but not enough to make it a common marketable commodity.

To the reaſons given before for determining this to be the Sil Marmoroſum of the antients; it may not be improper to add one more from Pliny's ſpeaking of the difficulty of making the Sil into a fine powder, *teritur difficillime*, ſays that author, l. 33. p. 634. 'Tis moſt probable he there means, the Marmoroſum or this kind, for it is not to be conceived he cou'd ſay this of the Attic, which he had declar'd to be a kind of mud, but of this it is an obſervation very remarkably true.

Sect. III. The Brown OCHRES.

1. *Ochra pallide fuſca levis, quæ Umbria Pictorum.* *Pale-brown, light Ochre, call'd Umber.*

THIS is the Umbria Terra and Creta Umbria of Charleton, &c.

It is a very fine, and very uſeful Earth; it never conſtitutes a ſtratum of itſelf, but is found ſometimes looſe and in ſmall lumps, among the ſtrata of gravel, &c. and ſometimes lodg'd in the perpendicular fiſſures of other ſtrata; there are indeed in ſome places found entire beds of an earth reſembling this, but they are in reality no other than Clays ting'd accidentally with particles of it, and not fit for any of the uſes this is put to. It is a fine ſmooth earth, of a cloſe compact texture, yet very light, and of an elegant pale brown in different degrees; it is of an irregular ſurface, very little duſty, but ſoft and ſmooth to the touch, and adheres very firmly to the tongue; it breaks eaſily between the fingers, and ſcarce at all ſtains the hands; it melts very freely in the mouth, and is of a perfect fineneſs, not leaving the leaſt gritty particle between the teeth; thrown into water it raiſes a conſiderable ebullition and hiſſing, and breaks into a parcel of ſeparate lumps, and thence moulders in time into a fine powder.

View'd by the Microſcope it appears of a ſpungy, but very regular texture.

It makes no effervescence with Aqua Fortis.

It burns to a deep brown, with ſome additional hardneſs.

It is found in Ægypt, Italy, Spain and Germany, but what we have is principally from different parts of the Turkiſh dominions; our own kingdom, however, is not abſolutely without it, for I have ſpecimens of it which I collected on Mendip Hills, in Somerſetſhire.

2. *Pſeudo-Ochra fuſca leviſſima, quæ Terra Colognienſis Pictorum.* *Deep brown, very light Baſtard-Ochre, called Cologn Earth.*

This is a ſubſtance of a very ſingular ſtructure, and worthy a particular attention.

It never conſtitutes a regular ſtratum, but is lodg'd in the earth among other ſtrata, in large flat detach'd maſſes, looking like parts of interrupted ſtrata, but not proving ſo on a cloſe examination; it is ever moderately dry while in the earth, and of a ſoft crumbly texture; when dry'd, it is of a deep duſky brown, of a cloſe, compact and fine texture, and extreamly light; it is of a ſmooth even ſurface, and dry, but not harſh o the touch, it crumbles to pieces very eaſily between the fingers, very ſlightly ſtains the hands, and adheres firmly to the tongue. It melts freely and eaſily in the mouth, is perfectly light and fine, leaving not the leaſt grittyneſs between the teeth, and has a ſtrongly aſtringent taſte, but that not like that of the Boles, or any thing elſe of the mineral kingdom, but plainly reſembling the taſte of oak bark; thrown into water, it ſhews a great difference from all the other Earths, for it ſwims on the ſurface, not ſinking till ſufficiently wetted, at which time it makes a ſlight ebullition and hiſſing, and after ſome time breaks into a very fine powder.

Dr. Woodward mentions what he calls a pale brown light earth from New England, and diſtinguiſhes by the name of Terra Natans, which, probably, is the ſame with this.

Examin'd by the Microſcope it appears of a ſpungy texture.

It makes no effervescence with Aqua Fortis.

And if brought within contact only of the fire, it immediately catches fire, and then may be taken away and left to itſelf, the fire never going out till the whole ſubſtance is reduc'd to pale yellow aſhes.

It is eaſy to diſcern from this account, that this, tho' generally eſteem'd an Earth, and known to the world by no other name, is no pure native Foſſil, but in reality contains more vegetable than mineral matter, and evidently owes its origin to the remains of wood long buried in the Earth; the aſhes made by burning this ſubſtance, I have try'd in the uſual way of making lixivial ſalts, from thoſe of vegetables, and have procur'd from them a fair, fix'd, alkaline ſalt, tho' in a very inconſiderable quantity.

It is dug in Germany and France; the quantity we have of it is from Cologne, where it is found very plentifully; nor is England without it, I have obſerv'd of it about Birmingham, and on Mendip Hills in different places there are many parcels of it, but none ſo pure as that of Cologne, ours being generally ſaturated with ochreous or clayey particles, which make it ſink in water, and burn but partially and irregularly.

SECT. IV. The Blue and Green OCHRES.

1. *Ochra cærulea friabilis, quæ lapis Armenus authorum.* *Friable, blue Ochre, call'd lapis Armenus.*

THIS is the Lapis Armenus, Cæſalp. 163. Boet. 292. Calc. Muſ. 468. Worm. 66. Κυανὸς αυτοφυὴς, Theophr. 100. 'Αρμενιακὸν, Aët. l. 2.

It is a very beautiful and very valuable earth, of an even and regular texture, and in colour of a very beautiful blue, ſometimes deeper, ſometimes paler, and frequently mix'd more or leſs with green; it is ſoft, tender and light, of an even and regular, but ſomewhat duſty ſurface, it adheres firmly to the tongue, is dry, but not harſh to the touch, eaſily breaks to pieces between the fingers, and does not at all ſtain the hands; it melts freely in the mouth, and is perfectly pure, leaving not the leaſt harſhneſs between the teeth, but is of a ſomewhat diſagreeable taſte; thrown into water it raiſes a conſiderable ebullition, and hiſſing noiſe, and after ſome time breaks into ſmall lumps, and from thoſe into a fine powder.

View'd before the Microſcope it appears of a fine, but ſpungy and cavernous texture.

It makes no efferveſcence with Aqua Fortis.

In burning it acquires a little additional hardneſs, but loſes all its colour, coming out of the fire an ordinary pale brown Ochre.

It is a very ſcarce Foſſil, provided that we keep up to this deſcription of it, and call nothing by its name but what is the genuine ſubſtance; for it frequently appears, in part, among maſſes of the green Ochre, next to be deſcrib'd, and gives occaſion to its being call'd, tho' improperly, by its name; I have only met with it pure from one place, which is the great mine of Goſſelaer in Saxony; and am inform'd, that even there it is very ſeldom found perfectly fine, being frequently ſpotted with green, and not rarely with black, and ſometimes having large lumps of the following Ochre immers'd in, and mixt with it; my particular ſpecimen has indeed a yet greater peculiarity in it, which makes it valuable even for its impurity, for it contains many pieces of a green arenaceous ſubſtance, hereafter to be deſcrib'd under the name of the Chryſocolla of the antients. It is remarkable, that that excellent author Theophraſtus was well acquainted with its being liable to this mixture, and has mention'd it in expreſs words, Καὶ Κυανὸς αὐτοφυὴς ἔχων ἐν ἑαυτῷ χρυσοκόλλαν. The native blue, or Lapis Armenus, having in it Chryſocolla. This has indeed appear'd to many late writers on theſe ſubjects no remarkable account, as they have learn'd to think the green Ochre to be next deſcrib'd, and which I have already obſerv'd, is frequently mixt with this, the Chryſocolla of the antients; but it will be made evident in its proper place, that this author knew no ſuch ſubſtance under that name, and this will help to prove that the Ochre here deſcrib'd, was the true native Cæruleum, or Lapis Armenus of the antients, and probably in the places whence they had it, it was generally found containing this ſubſtance.

Pliny indeed might give us ſome room to doubt, whether what I have here deſcrib'd, was the ſubſtance known by this name to the antients; for he deſcribes theirs to have been of the colour of Chryſocolla, and adds, that the Armenian was the beſt, becauſe it was the greeneſt. *Lapis eſt hic quoque Chryſocollæ modo infectus, optimumque eſt quod maxime viret*; or as father Hardouin has it, *Qui maxime vicinus eſt*, that is, which comes neareſt the true colour of the Chryſocolla, *Communicato colore cum cæruleo*, l. 35. p. 688. But this does not at all bring it to agree with the reſt of the antients, for their Chryſocolla was certainly green, and their Armenus as certainly blue: I ſhou'd therefore, as there is ſome difference in the copies of Pliny, be inclin'd to believe, either that this paſſage is not ſet right yet, or elſe that it is only a careleſs tranſlation of the paſſage in Theophraſtus before quoted, as I have been oblig'd to prove in my notes on that author lately publiſh'd, that Pliny is too often guilty of tranſlating from, and miſ-repreſenting him. The general teſtimony of the antients makes it clear, that their Lapis Armenus, or Cæruleum nativum, as they frequently call'd it, was of no other than what that word ſo very plainly expreſs'd of a blue colour: and Dioſcorides, whoſe knowledge of the Materia Medica, can never be enough commended, deſcribes it to be blue, ſmooth, of an even and regular texture, and friable. Words that can leave no room for a doubt, and are a ſufficient, and very good general deſcription of the body. Avicenna makes it in like manner blue, and ſo do the more correct late authors in general; many indeed are for reconciling the ſeemingly different opinions of Pliny and Dioſcorides, by ſuppoſing that it was ſometimes green, and ſometimes blue; but they don't conſider that this is abſolutely confounding the two ſubſtances, the blue and green Ochre, as theſe two ſubſtances may moſt properly be call'd, which, tho' ſometimes found together, and even mix'd with one another, yet are two as diſtinct bodies as almoſt any two of the ſame claſs can be: and Meſue has not a little added to this error, by giving his deſcription of the Lapis Armenus, from one of the common vitiated ſpecimens, in which he even mentions the green and black ſpots as a part of its character.

It is a glorious colour for painting, and was in the higheſt eſteem as ſuch among the antients. Theophraſtus has recorded it, p. 130. that it was a thing judg'd worthy of a place in the Egyptian annals, which of their kings had the honour of inventing the factitious kind: and that the native was a ſubſtance of that value, that preſents were made to great perſons of it; and that the Phœnicians paid their tribute in it.

2. *Ochra vireſcens.*
Green Ochre.

This is deſcribed by ſome authors under the name of Chryſocolla, and is called by the Germans Berg-grüen.

It is a denſe compact Earth, of a coarſe irregular texture, and conſiderable weight. It is of a pale, but not diſagreeable green, of a rough and uneven, but not duſty ſurface, it adheres firmly to the tongue, is ſoft and ſomewhat unctuous to the touch, does not eaſily break between the fingers, and ſcarce at all ſtains the hands; it melts ſlowly and diſagreeably in the mouth, is of a brackiſh nauſeous taſte, and leaves a ſlight grittyneſs between the teeth; thrown into water it makes a conſiderable ebullition and hiſſing, but does not readily moulder away to powder.

View'd by the Microſcope it appears of a denſe, and ſomewhat compact, but irregular texture, and ſhews a ſmall quantity of a white ſand mix'd among it.

It makes no efferveſcence with Aqua Fortis.

It loſes all its colour in burning, coming out of the fire a hard duſky brown Ochre.

It is found in many places in Germany, Italy and England, commonly in the neighbourhood of copper mines; and is a very valuable paint.

In many parts of Germany, they have a purer kind of this ſubſtance, which they ſeparate by art from the waters draining from ſome of their copper mines; this is mention'd by Dr. Woodward, V. 2. p. 2. of his foreign Foſſils, and differs no otherwiſe from this body, than as the waſh'd Ochres of Oxfordſhire, &c. do from thoſe ſent us in their natural condition.

SECT. V. Black OCHRES.

1. *Ochra friabilis ponderoſa nigreſcens.*
Heavy, friable, black Ochre.

THIS is a very fine Earth, and worthy to be brought into uſe among the painters, tho' at preſent unknown to them. It never forms an entire ſtratum, but is found in maſſes of different ſize, in the perpendicular fiſſures of ſtone, where it is always conſiderably heavy, dry and firm; but when brought out and kept for ſome time in the air, it becomes much lighter and more friable; it is of a perfectly fine deep black, of a compact, even and cloſe texture, and of a regular and equal, but ſomewhat duſty ſurface; it adheres ſlightly to the tongue, is ſoft and fine to the touch, breaks very readily into ſmall pieces between the fingers, and ſlightly ſtains the hands; it melts eaſily and freely in the mouth, is perfectly inſipid to the taſte, and leaves not the ſlighteſt grittyneſs between the teeth; thrown into water is raiſes a conſiderable ebullition and hiſſing, and after ſome time falls into ſmall lumps, and from them into a looſe powder.

Examin'd by the Microſcope it appears of a fine but ſomewhat ſpungy texture, and often diſcovers ſmall ſpecks of white, which are ſometimes alſo large enough to be diſcernible by the naked eye.

It makes no efferveſcence with Aqua Fortis.

In the fire it burns to a pale grey, with a little additional hardneſs.

It is common about mount Sorrell in Leiceſterſhire, among the rocks above the town; I have obſerv'd of it alſo in the foreſt of Deane in Glouceſterſhire; and Dr. Woodward mentions an Earth probably the ſame, from Cumberland, V. 1. p. 8. a. 69.

It has not yet been try'd in painting, but wou'd certainly make a very fine black.

2. *Pſeudo-Ochra levis nigreſcens, quæ Creta nigra Pictorum.*
Light black, baſtard Ochre, called black Chalk.

This is the Terra Nigra Randruſienſis, Worm. Muſ. 5. Charlt. Foſſ. 219.

It is a ſubſtance in ſome degree approaching to the Pſeudo-Ochra fuſca, before deſcrib'd, and commonly call'd Cologn Earth, but is ſomething leſs of the vegetable nature than that.

It it found in the Earth in broad flat pieces, from two to ten foot long, and from four inches to twenty in breadth, generally flat, but ſomething riſing in the middle, and thinner toward the edges, and is generally found in conſiderable quantities together; it is, while in the Earth, moiſt and flaky, but being dry'd becomes conſiderably hard and very light, but ever breaks in ſome particular direction; and if attentively examin'd, when freſh broken, appears of a ſtriated texture. It is of a fine black, of a tolerably cloſe and even texture, and rough, irregular, duſty ſurface; it adheres very firmly to the tongue, is dry and ſomething harſh to the touch, and breaks tolerably eaſily between the fingers, and ſtains the hands; it melts freely and eaſily in the mouth, and has a plainly vegetable taſte, but is not perfectly fine, leaving always a little harſhneſs between the teeth. Thrown into water it does not ſwim on it as the Cologn Earth, but ſinks readily and makes a conſiderable ebullition and hiſſing, but does not readily break or moulder to pieces.

Examin'd by the Microſcope it appears of a plainly vegetable texture, is harder and cloſer in ſome places than in others, and frequently contains a ſmall quantity of a fine pale yellow ſand, and ſometimes of a duſky browniſh Clay.

It makes not the leaſt efferveſcence with Acids.

When put into the fire readily ignites, but does not continue burning like the Cologn Earth, nor is like that reduc'd to looſe aſhes, but burns to a fine white ſubſtance, harder than before, and ſeeming of a middle nature between tobacco-pipe clay and wood-aſhes, or as if made up of a mixture of both; this calcin'd matter yields a ſmall quantity of an alkaline ſalt, and the experiments ſhew the ſubſtance itſelf to be partly of vegetable, partly foſſil origin.

It is much eſteem'd and us'd in painting, and is dug in Spain, Italy and ſome parts of Germany.

SERIES. I.

CLASS I. ORDER II. GENUS II.

TRIPELAS.

EARTHS compos'd of apparently ſimilar particles, naturally dry, and of rough duſty ſurfaces, but ſomewhat more firmly coherent than the Ochres, compos'd of fine but hard particles, and not readily diffuſible in water.

SECT I. White and Whitiſh TRIPELAS.

1. *Tripela albiſſima, quæ Creta Argentaria Antiquorum.*
Snow white Tripela, The ſilver chalk of the ancients.

This is the Creta Argentaria Plin. L. 17. p. 54. and L. 36. p. ult.

This is a very beautiful Earth, of a looſe friable texture and perfectly white; while in the ſtratum it is dry, friable and duſty, and falls from the pickaxes in large irregular maſſes, of an obſcurely plated or laminated texture, and thoſe more readily ſplitting into flat pieces than breaking in any other direction, tho' what appear to be diſtinct Lamina in them, are never continu'd or regular, but uneven, ſhort and interrupted. When dry it becomes ſomething harder than while in the ſtratum, and retains the ſame chalky whiteneſs it had there, is of a looſe and ſomewhat ſpungy texture, very light, and of a rough, uneven, duſty ſurface; it adheres very ſlightly to the tongue, is dry, hard and very harſh to the touch, eaſily breaks between the fingers, and a little ſtains the hands; it breaks immediately in the mouth into a coarſe and very hard powder, taſting like that of the pumice, but with no ſandy grittyneſs among it; thrown into water it makes a ſlight ebullition and hiſſing, and after ſome time falls into a looſe white powder.

Examin'd by the Microſcope it appears of a ſpungy and duſty texture.

It makes no effervefcence with Aqua Fortis.

In the fire it acquires a conſiderable hardneſs, without any change of colour.

It is dug in Pruſſia, and very much eſteem'd for cleaning ſilver veſſels: I have alſo heard that it is found in ſome parts of Germany, and in France; but have never ſeen any from either of theſe places; this is the ſubſtance originally known to the antients under the name of Creta Argentaria, becauſe us'd in cleaning and poliſhing ſilver veſſels: But the later authors have ſome of them erroneouſly deſcrib'd it.

2. *Tripela albo flaveſcens.*
Yellowiſh white Tripoli.

This is the Tripela, Charlt. foſſ. 220. Worm. 6. Tripolis Schrod. 320. Terra ſeu Gleba Alana. Calc. Muſ. 131.

It is a dry hard Earth, of a very pale yellowiſh white, of a firm texture and moderately heavy; it is ſometimes found of itſelf conſtituting a ſtratum, but more frequently in ſmall detach'd pieces among ſtrata of other matter. While in the Earth it is hard, firm and dry, of a pale yellowiſh colour, and not to be cut with the ſpade; when dry'd it loſes almoſt all its yellowneſs, and becomes nearly of a ſtony hardneſs, of a very regular, tho' not cloſe texture, and moderately heavy. It is of a rough, irregular, duſty ſurface; adheres ſlightly to the tongue, is dry, hard and harſh to the touch, is not to be broken between the fingers, and very ſlightly ſtains the hands; it breaks freely and readily in the mouth, but feels very hard tho' not gritty like ſand between the teeth; thrown into water it raiſes a ſlight ebullition and hiſſing, but does not break or diffuſe itſelf in it unleſs after a long time.

Examin'd by the Microſcope it appears of a looſe, open texture.

It makes no effervefcence with Aqua Fortis.

In the fire it burns to a very beautiful pale red, with no additional hardneſs.

It is dug in Germany, Saxony and France, as alſo about Venice, but moſt plentifully of all in many parts of Africa; it is us'd in cleaning braſs and other metals, and is the beſt of all ſubſtances for poliſhing ſtones, but is ſeldom to be had for the lapidaries uſe with us.

3. *Tripela laminata albo-rubeſcens.*
Reddiſh-white, laminated Tripoli.

This like the former ſometimes conſtitutes a ſtratum, and ſometimes lies in very large detached maſſes among the other ſtrata. While in the earth it is dry, but tolerably ſoft, and eaſily falls into flakes, but is not to be cut thro' with the ſpade. When dry it is of a very conſiderable hardneſs, of a fine pale reddiſh white, and of a moderate weight. It is of a looſe, open texture, and compos'd of a multitude of extreamly thin plates or flakes, laid cloſely on one another; it is of a ſmooth and ſomewhat gloſſy ſurface, adheres very firmly to the tongue, is dry and harſh to the touch, is too hard to be broken between the fingers, and does not at all ſtain the hands; it breaks readily in the mouth, and is hard but not gritty between the teeth; thrown into water it makes a very ſlight ebullition without noiſe, and does not readily break or diffuſe in it.

View'd by the Microſcope, it appears of a ſomewhat looſe texture, but compos'd of very fine particles; is uſually ſpangled with many flakes of a white gloſſy Talc, and ſeems diviſible into plates almoſt ad infinitum.

It makes no effervefcence with Aqua Fortis; and burns to a paler colour with ſome additional hardneſs.

It is dug in Germany, and in England on Mendip-Hills. I have ſeen many large maſſes there thrown up in opening coal-pits, but never heard of a diſtinct ſtratum of it.

It is very uſeful in poliſhing braſs, &c.

4. *Tripela albo-cinerea ponderoſa durior, quæ Terra Melia Dioſcoridis. Hard, heavy, aſh-colour'd Tripoli, The Melian Earth of Dioſcorides.*

This is a dry, looſe, harſh Earth, never conſtituting an entire ſtratum, but found in maſſes of different ſize, and lodg'd among the looſer ſtrata of other kinds. While in the Earth it is ſomewhat moiſt and crumbly, but when taken up becomes very dry, and conſiderably hard. It is of a pale greyiſh white, or light aſh-colour, very heavy, of a looſe, open and ſpungy texture, and very eaſily ſeperating into powder; it is of a rough, uneven, duſty ſurface, it adheres ſlightly to the tongue, is very dry, harſh and extreamly rough to the touch, not ſtaining the hands, nor eaſily broken between the fingers, but leaving a little duſt between them on handling, which is ſo harſh as to make a grating noiſe when the fingers are rub'd together; it breaks freely in the mouth, but is of a diſagreeable flavour, and has ſomething of the ſtyptic taſte of alum; thrown into water, it makes a briſk ebullition and hiſſing noiſe, but does not readily break or moulder in it.

View'd by the Microſcope, it appears of a looſe, crumbly and ſpungy texture.

It makes no effervefcence with Aqua Fortis.

It ſuffers very little change in the fire.

It is found in all the iſlands of the Archipelago, my ſpecimen is from the iſland whoſe name it bears; I remember to have ſeen it alſo thrown up from ſome gravel pits in England, but here it wants the aluminous taſte.

It muſt be of excellent uſe in cleaning metals, but is not yet known among the artificers, to whom it would be of great value.

It is ſomething ſtrange that among the numbers who have written on theſe ſubjects, it ſhould not have occur'd to any body, that the Melian of Earth of Dioſcorides, was a very different thing from the ſubſtance known by others under that name; what the antients in general meant by it, is deſcrib'd in its proper place, but it is plain the account of Dioſcorides meant a very different ſubſtance, which I find is as common in that part of the world as the other, and which was evidently the Tripela here deſcrib'd; his deſcription is very particular, and not only agrees very well with this ſubſtance, but what is ſomewhat ſingular, will agree with no other Earth in the world; he ſays, it was of the colour of the aſh-colour'd Eretrian, and that it was ſenſibly harſh and rough when rubb'd between the fingers, and yielded in rubbing a harſh grating ſound like that made by ſcraping the pumice, which is perfectly true of this and of no other Earth.

The antients us'd it as they did the pumice.

5. *Tripela leviſſima friabilis albo-rubeſcens. Light, friable, reddiſh white Tripela.*

This is an extreamly light and looſe Earth, and is generally found in large flat beds, irregularly diſpos'd among the other ſtrata; tho' it ſometimes forms a compleat ſtratum itſelf. I ſaw inſtances of both theſe caſes in the very pit whence I had this ſpecimen, and found near the ſurface many ſmall detach'd pieces beſide; while in the Earth it is very looſe, crumbly and friable, it cuts thro' eaſily but not evenly with the ſpade, and falls from it in large irregular maſſes, leaving an even but ſomewhat rough ſurface behind it; when dry, it is of a pale whitiſh or rather greeniſh red, of a looſe ſpungy texture, and remarkably light; it is of a rough, uneven, duſty ſurface, adheres ſlightly to the tongue, is hard, dry and harſh to the touch, eaſily breaks to pieces between the fingers, and duſts, but does not ſtain the hands; in rubbing between the fingers it yields ſomething of the ſame harſh ſound with the greyiſh kind before deſcrib'd, but in a much leſs degree; it breaks very freely in the mouth, and is harſh and dry between the teeth; thrown into water, it makes a very briſk ebullition and hiſſing, but does not readily moulder in it.

View'd by the Microſcope, it appears of a duſty ſpungy texture, more looſe and open than any of the before deſcrib'd.

It makes no efferveſcence with Acids, and ſuffers not the leaſt change in the fire.

I have obſerv'd it in Devonſhire, Dorſetſhire, and Somerſetſhire, and particularly plenty in a pit in the way from Bath to Mendip-Hills; it is alſo found in France and Spain, and in America. It is a fine ſubſtance for poliſhing ſtones: I have try'd it, and find it nearly equal to the yellowiſh Tripela, and much ſuperior to the common Rottenſtone which the lapidaries now commonly uſe.

SECT. II. The Browniſh TRIPELAS.

1. *Tripela fuſca levis.*
Light brown Tripela.

THIS is the ſubſtance which our workmen call Rottenſtone.

While in the earth it is ſoft, moiſt and very crumbly, eaſily cut thro' with the ſpade, but falling in rude maſſes, and leaving a rough ſurface behind it; when dry, it is of a duſty brown, very light, and of a conſiderable hardneſs; it is of a looſe ſpungy texture, and of a rough, irregular and duſty ſurface, it adheres ſlightly to the tongue, is dry, harſh and rough to the touch, does not break very eaſily between the fingers, and but ſlightly ſtains the hands; in rubbing it yields a little harſhiſh ſound; it breaks freely in the mouth, and is dry and harſh between the teeth; thrown into water, it makes a briſk ebullition and hiſſing, but does not readily moulder away in it.

View'd by the Microſcope, it appears of a harſh, looſe texture.

It makes no efferveſcence with Aqua Fortis.

In the fire it burns to an additional hardneſs, and pale and ſomething reddiſh colour.

It is dug in Derbyſhire, Shropſhire and Somerſetſhire, and is of great uſe among our braſiers and lapidaries, who now conſtantly uſe it in poliſhing.

2. *Tripela pallide fuſca dura.*
Hard, pale brown Tripela.

This is a very hard, dry and harſh Earth. While in the ſtratum it is too hard to be cut with the ſpade; it is dug with pick-axes, and falls in rude large maſſes: but it is not unfrequently found alſo naturally looſe and in detach'd pieces; when dry, it is of a very pale brown, ſometimes with a faint caſt of reddiſhneſs; moderately heavy, of a cloſe compact texture, and almoſt a ſtony hardneſs; it is of a ſmoother, more even, and leſs duſty ſurface than moſt of the other Tripelas; it adheres ſlightly to the tongue, is dry and rough to the touch, is not to be broken between the fingers, and ſlightly ſtains the hands; it breaks freely in the mouth, and is harſh and gritty between the teeth, ſeeming more hard and coarſe than any of the former except the grey. Thrown into water, it makes a ſlight ebullition and hiſſing, but does not eaſily fall to pieces in it.

View'd by the Microſcope, it is of a more compact texture than any of the former, and uſually ſeen to contain ſome ſmall flakes of a foliaceous Talc, which are in ſome ſpecimens alſo viſible to the naked eye.

It makes no effervescence with Aqua Fortis.

In the fire it burns to a pale reddiſh colour without any additional hardneſs.

It is dug in Wiltſhire, and ſome other parts of England, and is common in France and many other parts of the world; it is us'd among artificers in the ſame manner as the common Rottenſtone.

3. *Tripela fuſca ponderoſa ſcintillans.*
Heavy, ſparkling brown Tripela.

This is the heavieſt of all the Tripelas. While in the Earth, it is of a duſky but not deep brown, of a looſe, friable, crumbly texture, and not moiſt enough to be cut by the ſpade: when dry, it is of a fine pale brown, of a looſe ſhattery texture, and ſpangled all over with ſmall but very bright ſparkling particles; it is of a rough, irregular and duſty ſurface, it adheres ſlightly to the tongue, is dry and harſh to the touch, and makes a grating noiſe in rubbing; it breaks eaſily between the fingers, and ſlightly ſtains the hands; it breaks readily in the mouth, and is harder and coarſer than any of the others between the teeth, but is a true Tripela, owing its hardneſs to its own particles, and not containing the leaſt admixture of ſand.

View'd by the Microſcope, it appears of a looſe, lax texture, and full of ſmall fragments of ſpar lodg'd in it in all directions.

It makes a violent efferveſcence with Aqua Fortis.

In the fire it burns to a conſiderable hardneſs and fine red; thrown into water, it raiſes a conſiderable ebullition and hiſſing noiſe, and almoſt immediately falls into a fine looſe powder.

The efferveſcence it makes with Aqua Fortis, is evidently owing to the great quantity of ſpar it contains; and its breaking ſo readily in water, in which it differs from all the other Earths of this Genus, is probably owing to its particles being diſunited by the vaſt quantity of thoſe fragments intermix'd every where among them.

It is dug in many parts of England in ſinking for other things, but never has been brought into uſe, tho' it would certainly ſerve excellently for all that the braſiers uſe Rottenſtone about.

I have obſerv'd it plentifully in Staffordſhire, Northamptonſhire, and about London. In the tile Clay-pit near Tyburn, it lies in a thin irregular ſtratum, at about ſeven foot from the ſurface.

4. *Tripela fuſco rubeſcens levis ſcintillans.*
Light, browniſh red, ſparkling Tripela.

This is of the moſt lax and coarſe texture of all the Tripelas; while in the Earth, it is moiſt, crumbly and eaſily cut with the ſpade, but falls in rude pieces, and leaves a rough ſurface behind it; when dry, it is of a duſky, dull, reddiſh brown, light, and ſhattery, and of a very rude, coarſe, and open texture, and full of a multitude of large glittering particles. It is of a rough irregular ſurface, it adheres ſlightly to the tongue, breaks very eaſily between the fingers, and ſlightly ſtains the hands; it falls to pieces very freely in the mouth, and is very hard and gritty between the teeth; thrown into water, it makes a ſlight ebullition and hiſſing, but does not readily diffuſe in it.

View'd by the Microſcope, it appears of a looſe incoherent texture, full of very large flakes of foliaceous Talc, and ſometimes containing a ſmall quantity of a fine white ſand.

It makes no efferveſcence with Aqua Fortis.

It acquires a little additional hardneſs, but with ſcarce any change of colour in the fire.

It is dug in Wiltſhire, Suſſex, and ſome other Parts of England, and is us'd by the braſiers in London, but is not pure enough for the lapidaries.

FOSSILS

NATURALLY and eſſentially ſimple, not inflammable nor ſoluble in water.

Series the ſecond.

Thoſe of a regular ſtructure, but no determinate figure.
Of this Series we have three claſſes.

The firſt of thoſe which are foliaceous, *The* TALCS.
The ſecond of thoſe which are fibroſe, *The* FIBRARIÆ.
The third of thoſe which are granuloſe, *The* GYPSUMS.

Series the ſecond.

Claſs the firſt.

TALCS.

Foſſils compos'd of broad, flat and ſmooth Laminæ, or plates laid evenly and regularly on one another; eaſily fiſſile according to the Site of the plates, but not at all ſo in any other direction; flexile and elaſtic; bright, ſhining and tranſparent; not giving fire with ſteel, nor fermenting with acid menſtrua, and ſuſtaining the force of a violent fire, without calcining.

Of this claſs there are two orders, and under thoſe four genera.

Order the firſt.

Talcs compos'd of plates of great extent, each making ſingly the whole horizontal ſurface of the maſs.

Order the ſecond.

Talcs compos'd of ſmall plates in form of ſpangles irregularly diſpos'd, and uſually many of them concurring in different directions, to the formation of one ſurface of the maſs.

TALCS.

Order the firſt.

Genus 1. SPECULARES. *Talcs compos'd of viſibly ſeparate plates of extream thinneſs, and each fiſſile again into a number of others, yet finer.*

Genus 2. HYALINÆ. *Talcs compos'd of ſeparate plates of conſiderable thickneſs, and thoſe not fiſſile into any thinner.*

TALCS.

Order the ſecond.

Genus 1. BRACTEARIA. *Talcs compos'd of ſmall plates in form of ſpangles, each fiſſile into many finer and thinner ones.*

Genus 2. ELASMIDES. *Talcs compos'd of ſmall plates in form of ſpangles, moderately thick, and either not fiſſile at all, or only to a certain degree, or into a ſmall number of others, yet thick ones, and no farther fiſſile.*

SERIES II.

CLASS I. ORDER I. GENUS I.

SPECULARES.

1. *Specularis alba lucidiſſima bracteis latiſſimis, quæ lapis Specularis Plinii & antiquorum.*

White, ſhining Specularis, with large and broad leaves, commonly call'd Iſing-glaſs, and Muſcovy glaſs.

THIS is a well known Foſſil, and has been of great uſe among mechanics, even from the earlieſt times we have accounts of. It is a very pure, beautiful and regularly form'd body, of an equal, regular, and very elegantly laminated ſtructure; it is uſually found in maſſes, of a ſmooth and even ſurface, except at their edges, where the joinings of the various and innumerable plates it is compos'd of, make a multitude of thin ridges; in ſhape it is ever broad and flat, and tho' at times found in ſmall maſſes, is uſually of eight, ten or twelve inches breadth in each, and from half an inch to three inches in thickneſs. It is of a fine clear white, reſembling that of the pureſt white glaſs, and extreamly bright, ſhining and tranſparent. It is compos'd of an almoſt infinite number of broad, and beautifully even plates or flakes, laid with a perfect regularity on one another, and ſeldom parting naturally from each other; tho' by art they may be divided almoſt without end or meaſure, by getting the edge of a knife between them, or by any other means ſeparating them at the edges, they readily open, and part all the way, and that with proper care into Lamina, not exceeding the thickneſs of leaf gold, and of prodigious brightneſs and tranſparence. Its maſſes are uſually very plain and equal, but ſubject to certain flaws or tranſverſe ſtriæ, at which they crack, and will not let the plates be taken off in their full breadth, but theſe are fewer in this than in any other ſpecies. This genus of Foſſils has a very ſingular property of being ſpringy or elaſtic, very eaſily and readily bending, and as readily reſtoring itſelf to its former ſtate, and this particular ſpecies has that property in a greater degree than even any other; it is not eaſily broken tranſverſely, except at its own natural cracks or lines; it is moderately heavy in the maſs; it will by no art be made to ſtrike fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a fine ſilver-like whiteneſs; it readily parts into flakes when taken out of the fire, and very quickly loſes its tranſparence in it, but is not eaſily calcin'd.

Examin'd by the Microſcope it appears extreamly lucid and tranſparent, without even the ſlighteſt cloud, or appearance of even the ſmalleſt admixture of earth in it; the commiſſures of the plates at the edges, appear by this means even innumerable; and often, if the edges of large maſſes are examin'd, a coarſe earthy matter is found to have inſinuated itſelf into the furrows, between the ridges of their various congeries of plates; but this never penetrates to the depth of half an inch into the maſs; if a ſeparate piece examin'd has been ſmoothly and eaſily ſlip'd off from the lump, it appears as pure and free from flaws as cryſtal, or the fineſt glaſs; but if it has been bent forcibly in the ſeparating, a thouſand ſmall cracks in different directions diſcover themſelves in it, and take off from its tranſparence.

It is found in many parts of the world, the greateſt quantity of it any where known of, is in the iſland of Cyprus, where it lies at four or five foot under the ſurface, almoſt throughout the whole iſland; we have it alſo from Africa and Arabia, and it is plentiful in many parts of Ruſſia, and is of later times diſcovered to abound in the Alps, the Appennines, and many of the mountains of Germany.

There is much of it continually brought into England, and employ'd in various uſes, the miniature painters cover their pictures with it. Our makers of lanthorns uſe it for the better ſort inſtead of horn; and minute objects are uſually preſerv'd between two plates of it, for examination by the Microſcope; it is commonly ſaid, that Talc in the fire does not calcine nor loſe its colour; certainly it readily loſes its tranſparence, and changes its glaſſy, for an opake, ſilver-like white; and by repeated calcinations and immerſions into cold water, I have found it may be reduc'd to a ſubſtance eaſily powder'd in a mortar; and that powder, by farther calcination in a ſtrong fire, will, at length, become impalpable, and of a ſnow white.

The antients employ'd it in making their windows.

2. *Specularis lucida fuſca bracteis latis.*
Bright brown Specularis with broad leaves.

This is a very fine and valuable ſpecies, tho' ſomething inferior to the former in beauty and purity: It is a very beautifully and regularly form'd body, tho' ſomewhat leſs ſo than than the former, being a little more unequal, and ſubject to tranſverſe ridges, cracks and ſtriæ; it is of a fine, even, tabulated or foliaceous ſtructure, and is uſually found in broad flat maſſes, of a duſky and very opake hue, and of ridg'd, wrinkled, and often flaky ſurface, the external flakes having flown off into ſmall, whitiſh, and but moderately pellucid ſcales: its edges are generally conſiderably ſhatter'd and ſplit, and the extremities of the flakes appear more white, and leſs pellucid than thoſe of the former

mer ſpecies. The maſſes of it are uſually conſiderably thick as well as broad, four or five inches being a common thickneſs in them, and their breadth uſually not more than ſeven or eight inches; the maſſes of this ſpecies part more readily than thoſe of the former, into thick flakes, but are much more difficultly ſplit into thin and fine ones; and generally are full of flaws and cracks, which ſubject them to break eaſily, and take off greatly from their tranſparence. It is conſiderably elaſtic, but much leſs ſo than the former ſpecies, and ſeldom bears any great bending without being much damag'd by the cracks made by it.

It is of a ſomewhat deep and duſky brown, much reſembling the colour of the deeper brown cryſtal, and is extreamly bright, tho' much leſs tranſparent than the former ſpecies; the brown appears ſo deep in the larger maſſes as to paſs for black, and in the thinner plates into which it may be ſeparated by art, is ſcarce at all diſtinguiſhable; even in theſe, however, tho' the colour is gone the ſpecies is diſtinguiſhable, from its want of the perfect tranſparence of the white kind, and its being much more ſubject to flaws and cracks, which always make in it alſo more broad and opake lines; the whole maſſes are often of an undulated ſurface, and ſometimes convoluted, and naturally bent backwards and forwards, they break tranſverſly much more eaſily than the former ſpecies, and are conſiderably heavier than it.

It will not by any art be made to give fire with ſteel, nor ferments with, or is at all diſſolv'd by Aqua Fortis.

In a ſtrong fire it immediately loſes its brown colour, and more readily than any other ſpecies becomes opake and white, but it naturally ſhatters to pieces afterwards, not only ſeparating into a multitude of broad flakes, but theſe parting into multitudes of ſmall white and ſilver-like ſpangles.

Examin'd by the Microſcope it appears very bright and tranſparent, but ſomewhat leſs ſo than the former ſpecies, its thinneſt flakes generally ſhew a cloudyneſs, which tho' but very ſlight diſtinguiſhes them from the other; and are ever much crack'd, however carefully ſeparated, and ſhew a tendency to fly off into ſmall ſpangles, as well as to part according to their whole breadth; the edges of the pieces examin'd, ſhew that the flakes are much more looſely and irregularly laid together than in the former ſpecies.

This is found in theſe large maſſes only in Germany, many of the mountains there abound with it, and much of it is imported to us, and ſold among the finer kind. In ſmall maſſes mix'd in other Foſſils we have it in England, but never, that I have heard of, pure or ſeparate; the Talc in the *Granita alba duriſſima nigro variegata*, call'd Moor ſtone by the people of Cornwal, and in many other of our granites and ſtones of that texture, is a great part of it of this ſpecies. It often is lodg'd in theſe, in maſſes of ſufficient thickneſs to ſhew its colour, and then is plainly diſtinguiſhable to be of this ſpecies; often its flakes are ſo thin as to appear white, but are not for that reaſon to be miſtaken for the former kind; for the brown cryſtal appears white in thin pieces, and theſe white looking flakes of Talc, if taken to the Microſcope, will be found to have ever that faint cloudyneſs and breadth of opake lines at the cracks, that ſhew them to be truly of this ſpecies.

The origin and formation of theſe bodies, ſeems as naturally and eaſily to be accounted for as that of any thing of the foſſil claſs; the whole order and preſent ſtate of this part of the creation, leaves us no room to doubt, but that the particles of every ſpecies of it were once ſuſtain'd in extreamly minute parts in a fluid, which has evidently been now twice univerſally ſpread over the earth; at the time of its firſt creation, and at the general deluge: At which ever of theſe times we allow theſe bodies to have been form'd, we can ſuppoſe nothing more familiar, than that particles of matter of an inconceivable fineneſs ſuffer'd to ſubſide from among a fluid, wou'd form a plain flat ſubſtance, and farther quantities of the ſame matter continuing at times to ſubſide on theſe, muſt, by the mere effect of the fluid they ſubſide among, be diffus'd and ſpread according to the quantity of each ſediment, into thinner or thicker plates over the whole ſurface of the already form'd flakes; coarſer matter ſubſiding in large quantities, wou'd, by this means, form thick and coarſe plates or flakes, as we ſee in the quarries of ſlate and the other foſſil ſtones: And to the formation of theſe moſt extreamly thin and fine flakes of Talc, there is nothing more acquir'd than that the matter they are form'd of ſhou'd be extreamly fine, as we find by all experiments it really is, and that it ſhou'd have ſubſided in very ſmall quantities at a time.

3. *Specularis amethyſtina lucida bracteis latis.*
Purple, bright Specularis, with broad leaves.

This is the moſt elegant of all the ſpecies of Talc, and not leſs beautifully tranſparent than the firſt kind. It is as evenly and regularly form'd a body as the firſt ſpecies, and ſcarce at all ſubject to the ridges, cracks, or tranſverſe ſtriæ, ſo frequent in the former kind; but is of a fair and even tabulated ſtructure throughout.

It is uſually found in moderately large and ſomewhat flat maſſes, tho' very irregularly ſo, ſometimes being flat only on its under or lower ſurface, and riſing into a circular figure above, ſo as to expreſs very exactly the half of a ſphere; the plates growing every one leſs than another to the top, where they are not broader than a ſix-pence, and ſometimes both ſides are thus form'd, tapering from the middle into ſomething like an orbicular form; but theſe ſpecimens uſually have broader ends, and do not taper off ſo gradually as the hemiſpheric. Sometimes maſſes of it are found oblong or oval, and with ſcarce any tendency to flatneſs at all.

Which ever of theſe figures it is found in, it is, however, always of the ſame tabulated ſtructure; its ſurface where flat is generally very ſmooth and polite, as if not naturally the ſurface, but only made ſo by ſplitting: In the others it is ridg'd and furrow'd, being made of the commiſſures of a great number of plates, of about a twenty-ſixth of an inch thick. The larger maſſes uſually part very eaſily at the joinings of theſe, and break into ſuch thick flakes, which are ever perfectly ſmooth on both their ſurfaces, and with a little care may be ſplit into extreamly thin and very tranſparent pieces; it has a greater ſhare of elaſticity than any other ſpecies of Talc, and bears bending with leſs hurt, or without cracking better than any; its flakes are never wav'd or convoluted, and ſeldom have the leaſt ſign of tranſverſe cracks or ſtriæ. Theſe thicker plates, when compacted into a large maſs by the cracks and flaking at their edges, give the whole externally a mixture of purple and white, which makes it of a pale reddiſh hue; the flat ſurfaces of the larger flat maſſes appear of a blackiſh purple; thoſe thicker flakes into which the maſſes, eſpecially the orbicular ones, eaſily ſeparate, are of a fine and elegant amethyſt colour, but when ſplit into thinner pieces, the colour as in the brown kind becomes much paler, and in very thin flakes is wholly loſt, they being as perfectly colourleſs and glaſſy as thoſe of the ordinary kind; the orbicular maſſes are often of four or five inches diameter, the broad and flat ones much larger, it is very difficultly broke in a tranſverſe direction, and will bend every way in the attempt, and often inſtead of ſnapping ſplit at the place into almoſt innumerable thin flakes. It is extreamly bright and tranſparent, and ſomewhat leſs heavy than the brown kind, tho' more ſo than the common one.

It will not be made to give fire with ſteel, nor at all ferments with, or is diſſolv'd by Aqua Fortis.

In the fire it loſes all its tranſparence and colour, and is not diſtinguiſhable from the ordinary kind when taken out.

Examin'd by the Microſcope it appears of equal elegance, purity and tranſparence with the ordinary kind, and is in thin pieces not to be diſtinguiſh'd from it, except by its generally wanting thoſe cracks and flaws which the other commonly gets in the ſplitting; experiment will indeed at any time diſtinguiſh them, ſince in pieces of equal thickneſs, and with the ſame degree of bending, the ordinary kind will ever be found to have vaſtly the more numerous flaws, and the opake lines they make to be broader. It ſhou'd ſeem indeed that the pureſt Talc is ſubject to the feweſt, and thoſe the ſlighteſt and leaſt diſcernible flaws from external injuries; and that, as one might very naturally expect, the coarſer kinds crack the moſt eaſily, and leave the broadeſt remains of thoſe flaws: this ſeems therefore the moſt pure and fine of the whole claſs, and plainly owes its beautiful colour as the brown does alſo its, to ſome metalline tinge.

It is found in Muſcovy and Perſia, and no where elſe as far as is yet known. It is often imported into France in the maſſes, and the French are therefore well acquainted with it, and know its value, we ſeldom ſee it except ſplit into thin plates, ſo know but little of its colour; the painters both here and in France, know it for the beſt and fineſt kind, and theſe univerſally know it by the name of *Talc rouge*, red Talc, tho' in ſo thin pieces as to have no remains of its colour diſtinguiſhable.

SERIES

SERIES II.

CLASS I. ORDER I. GENUS II.

HYALINÆ.

TALCS, compos'd of very broad and ſingle flakes, each of conſiderable thickneſs, reſembling plates of glaſs; and not fiſſile into other thinner ones.
Of this Genus there is only one known ſpecies.

1. *Hyalina fuſca.*
Brown Hyalina.

This is an extreamly pure and very regularly form'd body, of a moſt equally laminated ſtructure, and found in maſſes of from three to twenty inches diameter; theſe are always flat, very ſmooth and polite, as if newly ſplit on their horizontal ſurfaces; and very rugged, notch'd, chop'd and furrow'd on their lateral ones; it ſeldom exceeds four or five inches in thickneſs even in its largeſt maſſes: it is of a fine, clear, ſhining deep brown, very much reſembling brown cryſtal both in luſtre and tranſparence; it is compos'd of a number of very even flat plates, or lamina, all of the ſame determinate thickneſs, and ever as thick in the ſmalleſt as in the largeſt ſpecimens; their thickneſs is about that of the finer crown glaſs us'd for ſaſh windows, they are laid with great evenneſs and regularity on one another, and cohere pretty firmly together; they are not at all exactly of the ſame breadth, but frequently their edges hang over one another a conſiderable way in the maſs; a knife, or chiſſel, being driven in at their commiſſures, which are thus eaſily known, the maſs ever regularly ſplits off according to the direction of the plate; and the ſingle plates may be one by one ſeparated off in the ſame manner, all eaſily and evenly parting, and eaſily coming off whole and without flaws; but theſe, tho' of this conſiderable thickneſs, are by no art to be ſplit any farther, nor can the leaſt horizontal lamina be ſeparated from them with any degree of regularity; they ſeem indeed to have been the ultimate plates in the original formation of the maſs, and conſtitute a very diſtinct Genus of Foſſils from thoſe Talcs whoſe plates are fiſſile almoſt *ad infinitum*; the maſſes are uſually free from flaws, and the plates all come off whole: the plates of this, tho' ſo thick, are eaſily flexile and very ſtrongly and remarkably elaſtic, always reſtoring themſelves immediately to their original ſtraitneſs, and not to be broken tranſverſely without great difficulty, nor ever parting into thinner laminæ in the attempt; it is very heavy, and conſiderably hard.

It will not give fire with ſteel; nor ferment with Aqua Fortis, nor is at all alter'd by a very ſtrong fire, not even loſing its tranſparence in it.

The Microſcope ſhews its plates to be truly ſingle, no appearance of a complex ſtructure, like that of the other Talcs, being diſcoverable in them after all the ſevereſt trials by bending.

It is found lodg'd in the Clay in the ſteep banks of the river Aube in Champaign, near the Town of Bar, and in ſome other places; but in no other parts of the world ſo far as is yet known.

SERIES II.

CLASS I. ORDER II. GENUS I.

BRACTEARIA.

TALCS, compos'd of ſmall plates in form of ſpangles, each plate being either naturally very thin, or fiſſile into very thin ones.

SECT. I. BRACTEARIA with ſmall ſpangles.

1. *Bractearium argenteo-vireſcens hebes bracteis parvis, quod Talcum Venetum Officinarum.*

Opake, ſilver-green foliaceous Talc with ſmall flakes. The Venetian Talc of the ſhops.

This is a very elegant Foſſile, and is well known among the ladies of France and Italy as a Coſmetic, but in England the difficulty of preparing it for uſe makes it neglected. It is of an extreamly irregular, tho' in ſome degree plated or foliaceous ſtructure; it is remarkably ſmooth and ſoft to the touch, of a lax and ſomewhat crumbly texture; the ſeveral moleculæ it is compos'd of cohering but ſlightly either in themſelves or with one another; their mutual are however of two the ſtronger than their peculiar coheſions, ſince they uſually break not at the commiſſures, but thro' the bodies of the ſmaller maſſes.

The lumps compos'd of theſe and in which it is uſually found, are of very rude irregular ſurfaces, often tabulated or ridg'd at their edges, and ever full of prominences and cavities, diſpos'd in great irregularity over their ſurfaces; the ſhape of theſe complex maſſes is perfectly irregular and uncertain; for as they are form'd of a multitude of others which have been cruſh'd together when newly concreted, they are found according to the ſtate of hardneſs the ſeparate maſſes were in when they came together, either more or leſs perfectly blended in the whole, or more or leſs affecting the appearance of a plain, ſimple maſs; the more they approach to this, that is, the more intimately the ſeveral ſmaller maſſes are blended together, the more the nodule compos'd of them approaches to a round or oblong figure, the moſt natural and uſual ſhape of the looſe nodules; and the leſs regularly the ſeveral maſſes were at firſt blended together, the more rude and irregular is the general figure reſulting from their combinations; the maſſes of this ſpecies are of various ſizes, from one inch to four, five, or ſix in diameter; it is whether in thoſe ſpecimens where the ſmaller maſſes are more diſtinct, or whether in thoſe where they are confuſedly blended together equally of an obſcurely and irregularly tabulated or foliaceous ſtructure, the flakes ſometimes are perfect enough to ſplit with proper care into thin ſcales, but more uſually of a leſs pure, regular and even ſtructure; very opake tho' of great brightneſs, and variouſly wav'd and convoluted one about another; they are leſs elaſtic in this than in almoſt any other ſpecies of Talc, nor will even bend very freely, but generally ſhatter and break irregularly and tranſverſely in the attempt; they ſeem indeed throughout the whole maſs compos'd of abſolutely the ſame matter, but differently diſpos'd, in ſome parts into even and regular plates or flakes like thoſe of other Talcs, and in others to have been more haſtily and confuſedly thrown together, and to have made ſmaller, thicker and more irregular maſſes; the whole is of a very elegant colour, made up of a mixture of an elegant and very pale bluiſh green, and a pure ſilvery white; it breaks very eaſily on being ſtruck, and tho' it is in the whole very bright, has leſs tranſparence than moſt of the other Talcs; in many of the coarſer pieces of this there may be diſcover'd a great analogy between its ſubſtance and that of the Morochthus, or ordinary French Chalk; it is conſiderably heavy, but like the others will not give fire with ſteel, nor ferment with Aqua Fortis, but burns to an opake white.

Examin'd by the Microſcope, ſome parts of it appear very regularly plated and a little pellucid, but all extreamly crack'd, flaw'd and ſhatter'd as if by ſome external force; the greater part of the maſs, however, is but very obſcurely and irregularly of this ſtructure; the flakes being very thick, ſhort and of irregular figures, and very white and opake.

It is dug in many parts of Italy, and uſually brought to us from Venice; it is us'd all over Italy and the neighbouring nations as a Coſmetic, reduc'd into an impalpable powder, by levigating on a porphyry after repeated calcinations and mix'd in pomatums, paſts, &c. The Chymiſts have been very fond of the notion of an oil of Talc, with which they imagined they ſhould be able to fix mercury, and turn it into ſilver; but, even if their oil had that power, it ſeems ſo difficult to be come at, that they wou'd not ſoon get rich by it; all the fluids they produce as oil of Talc, are evidently the product not of Talc, but of the various other ingredients they have employ'd in the making them.

2. *Bractearium lucidum nigricans bracteis minoribus.*
Shining, black Bractearium, with ſmall leaves.

This is a very ſingular and very elegant Foſſil. It is of an irregularly complex texture, like the former, and is found in maſſes of a rude, uneven ſtructure, of very rugged ſurfaces, generally in ſhape approaching either to orbicular or oval figures, and of various ſizes, from one to four or five inches in diameter: Theſe are ever compos'd of an almoſt infinite number of ſmall irregularly ſhap'd ſcales or flakes, very cloſely tho' unevenly laid together, and cohering mutually and pretty ſtrongly one with another; the ſeveral flakes or ſcales of which this is compos'd, are themſelves ſo many congeries of other finer flakes into which they eaſily ſplit, following the direction of the plate tho' ever ſo convoluted, twiſted, or inflected as they frequently are in the maſs; theſe are all of a very pure Talc, of a fine ſhining black, extreamly flexile and elaſtic, and ſuffering very little injury by bending; they uſually indeed appear as free from flaws after as before ſuch trials; they are by no means to be broke tranſverſely, are in the maſs conſiderably heavy, and will not give fire with ſteel, nor at all ferment with Aqua Fortis, they ſuffer a very conſiderable force of fire without any change, but at laſt become yellowiſh and opake.

Examin'd by the Microſcope, they appear of an extreamly pure, fine and even texture, very bright and gloſſy, and of a fine opake black, unleſs held againſt a ſtrong light, in which caſe they appear to be faintly pellucid and of a deep and ſomewhat greeniſh brown.

It is found in great plenty in ſome of the rivers in Yorkſhire, and is ſometimes, tho' more rarely, thrown up in digging in the ſame county; I have alſo ſeen it in ſome of the gravel pits of Northamptonſhire but ſparingly.

3. *Bractearium lucidum aureum bracteis parvis.*
Shining, gold colour'd Bractearium with ſmall ſpangles.

This is the ſubſtance known among writers on Foſſils by the name of Mica Aurea; and by its goldlike appearance, has tempted many to imagine it contain'd that metal; it is uſually found in ſmall maſſes of a looſe, irregular and crumbly texture, of very uneven ſurfaces, and generally of ſome tendency to a roundiſh or oval ſhape, frequently compreſs'd, and often evidently broken even as they lie in the earth; theſe are very various in ſize, but ſeldom large; they are from an inch and half or little more in diameter, down to the ſize of a ſmall pea. Theſe maſſes are compos'd of multitudes of ſmall flakes or ſpangles, of a fine foliaceous Talc, ſometimes cohering ſlightly, and ſometimes more firmly together, and at times have among them fragments or irregular maſſes of impure cryſtal, ſometimes ſmall lumps of Earth, but more frequently they are found pure and cohering abſolutely to one another: Theſe flakes are uſually but ſmall, ſeldom exceeding a quarter of an inch in diameter, and are extreamly ſmooth and ſoft to the touch, of a cloſe, compact and very fine ſtructure, generally of an oblong form, and ever made up of a multitude of very thin tables which eaſily part from one another and are very flexible and elaſtic, they are often rang'd in a ſmooth even manner, and make flat and even plates, but they are ſometimes convoluted, undulated and inflected; they

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are ever of a very beautiful yellow, very like the ordinary colour of gold, and extreamly ſmooth, bright and gloſſy, but very duſky and opake; tho' they ſplit or part horizontally with the greateſt eaſe, they are ſcarce at all to be broken tranſverſely, but bear bending backwards and forwards a great while firſt. They are conſiderably heavy in the maſs, will not at all give fire with ſteel, nor ferment with or be diſſolv'd by Acids, and will remain a long time in the fire without change of colour, but a very intenſe heat, continued a conſiderable time, turns them to a pale duſky grey.

Examin'd by the Microſcope, it appears very bright, and of a beautiful colour, but extreamly foul and opake; if view'd in a proper light, it ſhews a multitude of cracks and flaws in all directions, even in thoſe parts which have been ſubject to no injury ſince it was taken out of the earth; and very often the flakes that were near the edges of the maſs have a ſmall quantity of a duſty matter, ſeeming the ſame in all reſpects, but the want of the plated ſtructure, with the flakes themſelves lodg'd between their commiſſures.

The origin of theſe maſſes is merely from the falling together of a multitude of already form'd flakes of Talc in various directions; as the coheſions of theſe flat bodies where they do not fall immediately ſurface to ſurface, and that while yet moiſt, cannot be imagined to have been great, it can be no wonder that the maſſes we find of this are often evidently broken, or only parts of larger maſſes; we ſuppoſe all theſe things form'd in a fluid, and as that fluid cannot be imagined to have been always in a ſtate of perfect reſt, the motion of it might eaſily roll theſe maſſes againſt other harder bodies, and break or otherwiſe injure them before they came to be lodg'd in the ſtrata they were to remain among.

The conjecture of its holding gold was very natural from its colour, but there has been another equally erroneous among the better judges in many things; that is, the ſuppoſing it a kind of Orpiment; 'tis very certain that Orpiment is naturally of a Talcy conſtitution, but the trial by fire proves this to be nothing of that kind; ſince this burns to a pale grey, and that not without the force of an extreamly ſtrong fire; whereas Orpiment with a very ſlight one aſſumes a fine and elegant red.

It is found in many parts of the world, but no where ſo plentifully as in Arabia and Ægypt; there is of it in Germany, France and England alſo; and like moſt of the other Talcs, it is frequently found, immers'd in ſmall flakes in various ſtones, affecting the appearance of the Granites; as alſo looſe among the ſtrata of ſand and earth.

4. *Bractearium argenteum lucidum bracteis variis.*
Shining, ſilvery looking foliaceous Talc, with variouſly ſiz'd ſpangles.

As the former ſpecies is uſually call'd Mica Aurea, ſo this, from its colour, is call'd Mica Argentea, or Silver Mica, and is known by many by the name of Glimmer, or Catſilver; it is uſually found in rude irregular maſſes of an extreamly looſe texture, and very friable, or eaſily crumbled into their thin conſtituent flakes; theſe maſſes or irregular nodules are of an extreamly rough and unequal ſurface, perfectly uncertain and variable in ſhape, but oftener of an oblong figure than of any other, and uſually ſomewhat flatted; they are as uncertain in ſize as ſhape, being found from that of a ſmall pea, to four five, or ſix inches in diameter; theſe maſſes are compos'd of a number of ſmall complex flakes of Talc, which are ſometimes found thrown together into a lump without any intermediate matter, but have more frequently either an impure cryſtal or an indurated earth mix'd among them, and ſerving as a cement; the flakes are uſually ſmall but extreamly various in ſize, in the ſame maſs; few being of more than a ſixth or eighth of an inch long, and multitudes of all ſizes down from this to the ſmalleſt viſible ſpangle; they are very irregularly thrown together, the edges of ſome and flat ſurfaces of others, with many in angles of all degrees between them appearing in every part of the maſs; they are, if of any determinate ſhape, naturally angular and oblong, tho' multitudes of them have no tendency to this figure; they are of perfectly ſmooth and even ſurfaces, very ſoft to the touch, and each made up of a vaſt number of thinner plates or flakes, and eaſily ſplit longitudinally into them; theſe are very flexile and elaſtic, generally laid evenly ſtrait over one another, but ſometimes oddly crook'd and turn'd round one anothers edges; they are ever of an extreamly bright and beautiful, but ſomewhat greyiſh white, and with the advantage of their remarkable gloſs, carry very much of a ſilvery appearance; they are very opake, and evidently contain more of ſome extraneous matter than the former; ſince, tho' very flexile, they are much more eaſily broken tranſverſely after two or three bendings; they are in the maſs conſiderably heavy.

They will not at all give fire with ſteel, or ferment with Aqua Fortis; and are very difficultly made to ſuffer any change in the fire; when they do it is to a pale fleſh colour.

Examin'd by the Microſcope, they appear more opake and coarſe than thoſe of the former ſpecies, the thinner ſcales alſo appear leſs evenly laid on one another, and the cracks between them, eſpecially toward their edges, are often large and fill'd with extraneous matter.

It is found in great abundance in Sileſia and Bohemia, as alſo in France, Italy and England; in the iſland of Schetland, the ſhores are ſtrew'd with ſmall pieces of it, and with its matter looſe, and in form of a flaky ſhining ſand, perhaps naturally ſo, perhaps owing to the waves having waſh'd great quantities of the laxer maſſes to pieces.

5. *Bractearium lucidum flavo-vireſcens bracteis minimis.*
Greeniſh, ſhining, foliaceous Talc, with very ſmall ſpangles.

This is a very pure and elegant ſpecies, and tho' leſs glaring than either the yellow or white kind, is not at all inferior to them in beauty; it is uſually found in maſſes of a very coarſe, looſe and ſhattery texture, and of extreamly irregular ſhape, ſome being roundiſh, others angular, but moſt very much compreſs'd or flatted, of rough ſcaly ſurfaces, and from one inch to eight or ten in diameter; theſe are compos'd of an almoſt infinite number of extreamly minute ſpangles, or plated flakes of a fine foliaceous Talc; they are ever found in perfect purity, have no ſparry, earthy or cryſtalline matter by way of cement, and have but very ſlight coheſion one with another; inſomuch that the whole maſs of them is eaſily crumbled to pieces, and is not to be handled without leaving many of the ſpangles on the fingers; the plates or ſpangles are all ſmall, the largeſt of them ſeldom exceeding the twelfth of an inch in breadth, and great numbers being almoſt too minute to be diſtinguiſhable by the naked eye, they are thrown together in all directions, are of no determinate or regular ſhape, very ſoft and ſmooth to the touch, of even and gloſſy ſurfaces, and each compos'd of an innumerable multitude of extreamly thin ſcales or flakes, very eaſily ſplitting into them, and extreamly flexile and elaſtic; they are ſometimes ſtrait and plain, but notwithſtanding their ſmallneſs, much oftner curl'd, wav'd and bent round one another's edges; they are of a very agreeable yellowiſh green, conſiderably bright, and very tranſparent; they make a very elegant and beautiful maſs, and are in it of conſiderable weight.

They will not at all give fire with ſteel, or ferment with Aqua Fortis, but pretty readily calcine to a pale greyiſh white, and become very opake, and apt to ſhiver to pieces.

Examin'd by the Microſcope, they appear of an extreamly pure and elegant texture, and very beautiful colour; they ſeem indeed much of the nature of the ordinary broad flak'd kind, commonly call'd Muſcovy glaſs, only beautifully ting'd like the Gemms, with ſome metalline particles. The colour going off in the fire like that of the emerald, ſaphire, &c. much countenance the latter part of this conjecture, as their matter calcining into an opake and more eaſily fiſſile maſs does their being of the nature of the ordinary Muſcovy Talc.

It is found in great plenty on the ſhores of Italy, and is ſometimes thrown up in digging in ſmall maſſes on Mendip-Hills, and in ſome other parts of England; moſt of the other bodies of this Genus are found at times either looſe or immers'd in the more ſolid maſſes of ſtone; this I have never yet ſeen or heard of in any other but this its own pure and natural form.

6. *Bractearium hebes cinereo-virens ſquammis minoribus.*
Dull looking greyiſh green, foliaceous Talc, with ſmall ſcales.

This has a coarſe reſemblance of the Venetian Talc before deſcrib'd, but when any thing attentively examin'd, appears of a very different ſtructure and conſtitution; it is found in maſſes of a coarſe flaky ſtructure, yet conſiderably compact, firm, and hard, of very rugged and unequal ſurfaces, in ſhape generally ſomewhat flat, and in ſize from two or three, to ten or twelve inches broad; theſe are compos'd of an almoſt infinite number of extreamly ſmall flakes, not cohering to one another, as in moſt of the ſpecies, but lodg'd among a confus'd maſs of a greeniſh hue, and of the ſame ſubſtance with themſelves, only not form'd into flakes; this ſerves them as a cement, and in many places holds them extreamly firm together, tho' in others it is more friable; the flakes are of various ſizes, but uſually ſmall, they are lodg'd in various directions in this maſs, and are of no determinate ſhape, but of very ſmooth ſurfaces, and extreamly ſoft to the touch; they are each compos'd of a great number of thinner flakes, into which they are eaſily ſeparated, even by rubbing, and are leſs flexile and elaſtic than many of the other kinds; they are ſometimes laid very ſmooth and flat in the maſs, but more frequently are wav'd and bent. They are of a very agreeable pale greyiſh green, often with an admixture of whiteneſs, and ſometimes with very little either of white or grey, but of a pure and unmix'd, tho' faint green; they have leſs of that glittering brightneſs, ſo frequent among the foliaceous Talcs, than almoſt any other ſpecies, and are leſs tranſparent alſo than moſt others; the maſs does not eaſily break, but requires generally a ſmart ſtroke of a hammer, and then flies very irregularly to pieces, leaving very ragged and unequal ſurfaces; it is of conſiderable weight.

It does not give fire with ſteel, nor at all ferment with Aqua Fortis.

It burns after ſome time to a whitiſh grey.

Examin'd by the Microſcope the flakes appear of a ſomewhat ſilvery gloſs, and look not unlike fragments of the ordinary Muſcovy Talc; when burnt, they are generally very full of cracks and flaws, and the green colour is not equally diſpers'd thro' them in many parts, but lodg'd in large blotches deeper at the center, and fading away at the edges, tho' ſome flakes are very uniformly and beautifully green; the general matter of the maſs is of the ſame colour with the flakes, but like them is irregularly ting'd with the green; it is evidently of the ſame matter alſo with them, but very diſorderly and irregularly thrown together, yet in many places is fairly of a plated texture. The too haſty coaleſcence, and too large admixture of earth were probably the occaſions of its not forming into as regular flakes as the reſt, as the earth manifeſtly contain'd in the flakes themſelves makes them opake and dull, and prevents them from being ſo flexile and elaſtic as the other ſpecies.

It is found in many parts of England on the ſhores, particularly in Yorkſhire and Lincolnſhire.

7. *Bractearium lucidum cinereum ſquammis tenuiſſimis.*
Grey, ſhining, foliaceous Talc, with very thin ſcales.

This is a ſingular and very beautiful ſpecies, of an agreeable colour, and of more brightneſs than almoſt any other kind. It is found in maſſes of a rude, irregular, and very lax and crumbly texture, of a tolerably ſmooth and even, and very gloſſy ſurface, and extreamly various in ſhape and figure, being ſometimes approaching to round, ſometimes irregularly oblong, and often broad, flat, and of a laminated ſtructure: theſe maſſes are not leſs various in ſize than in ſhape, ſome of them being found of leſs then an inch diameter, and others often twelve or fifteen inches. They are compos'd of an infinite number of very variouſly diſpos'd flakes, laid in a very confuſ'd and irregular manner over one another, and making up of themſelves the whole ſubſtance of the maſs, without the intervention of any earth or other matter by way of cement.

Theſe flakes are very various and irregular in ſize and ſhape; all that they ſeem to have any regularity in, is the being very thin; they are often very broad, ſome of them not leſs than a quarter of an inch, but more uſually the larger are of about half that breadth, and the reſt in all degrees to the ſmalleſt viſible ſcale; they are never of any determinate ſhape, but oftener have a tendency to roundneſs than to any other figure; and where the maſſes are freſh broken, reſemble nothing ſo much as a vaſt quantity of fiſh ſcales crowded and cruſted together; they are generally of a very ſmooth and even ſurface, and always conſiderably ſoft to the touch; and tho' the thinneſt of the compound flakes of all the ſpecies, are yet viſibly compos'd of a great number of other thin ſcales, and thoſe ſo looſely join'd, both in their own particular ſtructure, and that of the general maſs, that it cannot be handled ever ſo lightly, without leaving a great quantity both of the compound flakes that compoſe it, and of the ſcales they ſeparate into, looſe upon the fingers.

The broader flakes are eaſily ſeparated from the maſſes, and are of a very pure ſtructure, and extreamly flexile and elaſtic, and not to be broken tranſverſely by any art, repeated bendings of them backward and forward, only ſerving to make them ſplit into inconceivably thin ſcales, but never making them break acroſs. They are uſually very ſmooth and even in the maſs, but often in the different parts of it are found variouſly wav'd, curl'd and bent: they are of a bright, whitiſh or ſilvery grey, and extreamly glittering, but very little tranſparent; the maſſes break very eaſily, and indeed are often ſo friable, as readily to crumble between the fingers; they are conſiderably heavy, and will not at all give fire with ſteel, nor ferment with Aqua Fortis.

It burns to a fine glittering gold yellow; and this is the only ſpecies of grey Talc that does ſo, but this ſo remarkably reſembles what the druggiſts call litharge of gold, when properly burnt, as ſcarce to be diſtinguiſhable from it. Dr. Woodward mentions a ſpecies among what he calls the Micæ, which he obſerves has this appearance when burnt, V. 1. p. 64, ſp. 27. It was probably the ſame with this, the knots of red and black matter he found in the ſpecimen of it ſent to him, were no part of the ſubſtance, but extraneous matter that might as well have been found any where elſe as immers'd in it: I have ſeen much of this, but never any with them.

Examin'd by the Microſcope the flakes appear of a very remarkable brightneſs, not at all inferior to the fineſt Muſcovy Talc, and are ſo thin as to be every where when thus examin'd, moderately tranſparent; they are laid extreamly cloſe together, and tho' extraneous matter will ſometimes get among theſe, as well as all other natural nodules; there are many ſpecimens, in which the ſtricteſt examination by the Microſcope cannot ſhew the leaſt admixture of any thing, but the whole is pure foliaceous Talc.

The external likeneſs of the flakes in this and ſome other ſpecies, to the matter of the ordinary Muſcovy Talc, has been the occaſion of that common error of ſuppoſing almoſt all the Talcs alike, and that thoſe in ſmall flakes in ſtone, do not at all differ from the ordinary broad flak'd kind, otherwiſe than in bigneſs; experiment proves them, however, to be all abſolutely different, and the ſame degree of fire calcines the Muſcovy Talc only to a ſilvery brightneſs and opacity, and this particular ſpecies to a perfect gold colour.

This is very frequent on moſt of the Engliſh ſhores.

SECT. II. BRACTEARIA with large Spangles.

1. *Bractearium ſplendidiſſimum læte vireſcens bracteis latis.*
Bright, green, ſhining Bractearium, with broad ſpangles.

THIS is an extreamly elegant and beautiful ſpecies, and approaches moſt of any of this Genus, to the broad plated Talcs of the former; but tho' its flakes are much larger than thoſe of any other of this Genus, they are yet much ſmaller than thoſe of any kind of the former, and differ from them in their order and diſtribution, being not form'd evenly into ſingle and regular maſſes, but thrown into cluſters, and thoſe rang'd in different directions in the ſame maſs; it is of a very elegantly plated ſtructure, extreamly ſoft and ſmooth to the touch, and is found in complex maſſes of very irregular, unequal, and opake ſurfaces, full of prominences, cavities, and narrow ridges; and whitiſh in ſome parts, blackiſh in others, and of a pale green in the reſt; it is perfectly irregular and uncertain in ſhape, but in ſize ſeldom exceeds two inches in diameter, or is leſs than of one inch.

It is compos'd in each maſs of a number of other ſmaller maſſes, each broad and flat, and made up of a congeries of fine thin flakes, ſometimes very plain, ſmooth and equal, but more uſually wrinkled, crack'd and convoluted in different waves; it eaſily breaks on being ſtruck, but uſually parts in the bodies of theſe ſmaller maſſes, and not at the joinings of them; theſe cohere but ſlightly in their ſeveral flakes, and are of an extreamly agreeable pale green, and are clouded in ſome places with a very dark ſhade of the ſame colour, nearly approaching to black: their ſeveral flakes part very eaſily from one another, and are extreamly flexile, but much leſs elaſtic than thoſe of the former ſpecies, uſually remaining in the poſture they are bent into like pieces of thin mill'd lead: The colour of theſe flakes, tho' extreamly beautiful in the maſs, is loſt as in the other Talcs, when ſeparated into very thin ſcales; they then appear perfectly colourleſs, but leſs pellucid than the former kinds; they have all ſomewhat of a whitiſh caſt, and are ever crack'd and flaw'd in innumerable places, even while in the maſs; the darker and paler green parts of the ſurface, are where theſe flakes are ſeen leaſt cruſh'd or injur'd; the whiter are the ſame plates ſeparated, cruſh'd or bruis'd at their edges, and acquiring that colour and opacity from an almoſt infinite number of cracks: The flakes of this, tho' they ſplit with great eaſe to any fineneſs, break in a croſs or tranſverſe direction with great difficulty.

It is conſiderably heavy, will not be made to ſtrike fire with ſteel, nor at all ferments with, or is diſſolv'd by Acids.

Put into a ſtrong fire, it loſes its greenneſs and tranſparence, and becomes a perfectly white, dull looking maſs, and like the others, by repeated heatings and quenchings in cold water, may at length be made friable, and reduc'd to an impalpable powder.

Examin'd by the Microſcope it appears to owe its opacity merely to its numberleſs cracks, for in the ſmall interſtices of theſe, it is as pellucid and bright as any of the former ſpecies.

It is found in the beds of rivers in many parts of Italy, and probably owes the whiteneſs and opake look of its ſurface, to the injuries it continually receives from being in ſtorms and rapid currents, carry'd away by the ſtream, and daſh'd againſt the rocks and ſtones which lie in its way.

Some years ſince I received a very beautiful ſpecimen of it, found in digging near Viterbo, in the Campania of Rome, with account, that it lay at about 16 foot depth, under ſtrata of vegetable mould, fine white ſand, loam of a whitiſh brown; and that under it there lay a bed of a greeniſh chalky clay; according to the opinion of the author of my account, I doubt not but this green clay was a true Terre Verte; there is ſome conſiderable analogy between the indurated clays, of which that is one, and the Talcs, and both were in this place probably colour'd by copper.

2. *Brac̄tearium lucidum e grizeo pallide flaveſcens ſquammis majoribus.*
Shining, greyiſh yellow foliaceous Talc, with large ſcales.

This is a very ſhewy and glittering ſpecies, and from the advantage of the great breadth of its ſcales makes as gay and ſplendid an appearance as any one of the Genus. It is found in maſſes of a conſiderably firm and compact texture, tho' rough and irregular, and ſeeming very ſlightly put together; they are ever of extreamly rough and unequal ſurfaces, very uncertain in ſhape, but ſeldom have much tendency to roundneſs, and are ſometimes of conſiderable ſize, as of eight or ten inches in diameter, tho' more frequently of only two or three inches. Theſe maſſes are compos'd of a number of very broad and large, but very thin and light flakes, generally free from any extraneous matter, and cohering to one another without any thing elſe for their cement; nor is it a little wonderful when their ſtructure is conſider'd, that they ſhou'd cohere ſo firmly as they do; they ſeem very irregularly lodg'd together, falling againſt and upon one another in all directions; their ſhape is uncertain, but generally as broad as long; their ſurfaces very bright and gloſſy, but never ſmooth or even, but undulated, convoluted and inflected more than thoſe of any other ſpecies; they are very ſoft to the touch, they eaſily ſplit into a vaſt number of almoſt inconceivably thin plates of their own ſtructure, and are flexile and elaſtic to a very great degree, but by no means to be broke aſunder tranſverſely: They are of a pale but not diſagreeable colour, plainly compos'd of a mixture of a pale ſtraw colour with a ſilvery grey: In ſome lights they look almoſt entirely grey, and in others almoſt entirely yellow, they have very little tranſparence, and are leſs heavy than many others in the maſs.

It will not at all give fire with ſteel, or ferment with Aqua Fortis.

In the fire it pretty readily turns to a more duſky grey, without the leaſt remainder of yellow.

Examin'd by the Microſcope the flakes appear extreamly gloſſy, of very ridg'd ſurfaces, and are without exception all mark'd with long parallel tranſverſe lines, ſometimes in form of cracks or flaws, but more frequently in long prominences, like ſo many hairs ſtretched a-croſs the plates; theſe are ſometimes ſo large as to be diſtinguiſhable by the naked eye, but where they are not ſo, the Microſcope never fails to ſhew them: It appears alſo here of a much paler or greyer colour than to the naked eye, and in thin flakes is moderately tranſparent.

It is very frequent in Italy on the ſhores, and in digging: they have of it alſo in Germany and ſome other countries; but we have it not at all that I know of here, either in its natural form or immers'd in other Foſſils.

Near Eſlingen, a German town in the circle of Swabia, there has lately been found a large quantity of it in digging; it lies there in a looſe clay, at about nine feet deep.

3. *Bractearium niveum lucidiſſimum odoratum bracteis undulatis, quod lapis odore violarum Authorum.*
Snow-white gloſſy ſweet ſcented foliaceous Talc, with undulated ſcales, the violet ſtone of Authors.

This is an extreamly ſingular ſpecies, not only for the beauty and diſpoſition of its flakes, but for its perfum'd ſmell, which when firſt taken up, it ever has very ſtrongly, and always retains ſo much of as to make itſelf known by it when freſh broken. The Germans have many ſpecies of talcy ſtones with this ſcent in a fainter degree, as they have many of the quarry ſtones which ſtink when freſh broken; and the firſt of theſe kinds they call all by the name of viol-ſtein, as they do all the latter ſwine-ſtein; this ſpecies, however, as it poſſeſſes the ſmell in a greater degree, and retains it much longer than any of the other kinds, is moſt properly the ſpecies to be diſtinguiſh'd by the name derived from it.

It is found in maſſes of a very compact and firm texture, tho' of an extreamly rude, diſorderly and irregular ſtructure; they have uſually tolerably ſmooth but opake ſurfaces, but are extreamly bright and glittering when broken; their ſhape is uſually roundiſh or oblong, generally ſomewhat compreſſed, and evidently owing the evenneſs of the ſurface to their having been hard enough to bear the rubbing againſt harder maſſes without breaking; the ſurface, however, is not what might be call'd ſmooth, otherwiſe than in compariſon with the ragged ones of the other maſſes of this Genus, it being, tho' not ridg'd or flaky, all over full of ſmall prominences and cavities, the ſize of theſe maſſes is very various, ſome of them being of but an inch or leſs, and others of ten or twelve inches in diameter. They are all compos'd of an almoſt infinite number of thin, extreamly beautiful and ſnow white flakes; theſe are not form'd into ſeparate congeries or thick maſſes before they enter the compoſition of the general one, but are all broad, thin and flaky; the maſſes ſeem to the eye compos'd wholly of theſe flakes, with no admixture of any other matter, but that is only owing to their great number, and cloſe arrangement, for they evidently have a foreign ſubſtance by way of cement, which their firm coheſion and weight ſufficiently prove; and which, tho' often bury'd among them in ſmall particles, is in ſome maſſes diſtinct and viſible, in larger congeries of a black, a yellowiſh, or a duſky brown matter.

The flakes which make up theſe maſſes are extreamly various in ſize, and perfectly irregular in ſhape and figure; they are many of them of near half an inch in diameter, and many of all ſizes below that, down to the ſmalleſt viſible ſpeck; they are arrang'd in no ſort of order, but lie in all directions among and over one another; they are ſoft to the touch as the fineſt Venetian Talc are, each is compos'd of a ſeemingly infinite number of thinner ſcales, extreamly eaſily ſeparated from one another, and ſplitting indeed on the ſlighteſt touch; they are more flexile and elaſtic than any other known ſpecies of Talc, and are never ſmooth or flat as many of the others are, but all naturally wav'd, bent and convoluted round about, and over and under one another in a moſt elegant manner; they are in colour of a pure and elegant ſnow white, tho' often in ſome parts of the maſs ſuperficially ting'd with a yellowiſh caſt, and are extreamly gloſſy and glittering, tho' but very little pellucid. The maſs breaks irregularly on being ſtruck, and ſmells, when freſh taken out of the earth and newly broken, not leſs ſweet than a bed of violets; and this ſcent it retains ſo long, that after almoſt ever ſo many years keeping, it will be known by it, on beating a ſmall piece to powder in a mortar: it is nothing like the ſmell of any of the common perfumes, but ſeems a mix'd one of that of roſes and violets. It is, when freſh broken, the moſt gloſſy of all the Talcs, and is more remarkable in weight even than the former ſpecies.

It will not at all give fire with ſteel, nor ferment with Aqua Fortis.

In the fire it burns to a duſky browniſh red.

Examin'd by the Microſcope the flakes appear extreamly gloſſy, and when thin, a little pellucid; they ſeem very looſely laid together, and have often empty cracks between them; their yellow colour of ſome of them is plainly ſuperficial, and owing to a thin coat of earthy matter ſpread over them, and they are ſeen every where interſpers'd with ſmaller or larger moleculæ, of a blackiſh or deep brown, opake and porous, ſtony ſubſtance; the great weight of this tempted me to try to what it was owing, and the reſult of the experiment was, that it yielded nearly one half iron; the yellow coat over ſome of the plates, when this was known, became eaſily accountable for, and it is indeed plainly no other than a ſlight cruſt of an ochreous matter, waſh'd by the water continually coating over theſe bodies while in the earth from among the iron ore, ſo plentifully mix'd in the maſs. It is to this iron ore that the maſs wholly owes its firmneſs and coheſion, for the talcy matter is ſo ill join'd together, that there is no handling the lumps without their flaking off in great quantities on the hands.

It is common on the ſhores of Italy, and the mountains in Germany abound with it. It is made no uſe of; but yields ſo large a quantity of iron, and parts with it ſo eaſily, that I am convinc'd it might be profitably work'd for that metal.

SERIES II.

CLASS II. ORDER II. GENUS II.

ELASMIDES.

TALCS, compos'd of ſmall plates in form of ſpangles, each either ſingle and not farther fiſſile, or if complex, fiſſile only to a certain degree, and that into ſomewhat thick Laminæ.

SECT. I. ELASMIDES with ſmall Spangles.

1. *Elaſmis lucida cinereo-fuſca bracteis parvis.*
Shining, blueiſh-brown Elaſmis, with ſmall ſpangle.

This is uſually found in maſſes of a tolerably firm and compact texture, of very rugged, unequal ſurfaces, generally of an orbicular or pebble-like figure, and in ſize from the bigneſs of a horſe-bean to five or ſix inches in diameter; theſe are compos'd like the others of this order, of a number of ſmall but generally thick ſpangles, not intermix'd with either earth, cryſtal, or any other extraneous ſubſtance, ſerving them as a cement in the maſs, but cohering firmly one to another; they are generally pretty uniform in ſize, but of perfectly irregular ſhapes, and ſeem thrown together without the leaſt order or regularity, ſome cohereing edge to edge, others flat to flat, and others in angles of all degrees, but all very firmly; theſe plates are not ſoft to the touch as many of the others, but are very hard and harſh, and feel more like ſtone than a foliaceous Talc; they are of tolerably ſmooth but leſs gloſſy ſurfaces than moſt of the others, and are compos'd of a much ſmaller number of flakes, and much more difficult to be ſplit, they are generally very viſibly crack'd and flaw'd on their ſurfaces, and in attempting to ſplit them they frequently break tranſverſely at theſe lines; they are, notwithſtanding this, however, conſiderably flexile and elaſtic, but in bending they often throw off ſmall ſcales from one or both ſides; they are ſeldom wav'd, convoluted or bent, but uſually lie evenly, three, four or more on one another, to a conſiderable thickneſs in the whole, the cracks on the ſurface of the outer one being eaſily ſeen, and the edges of the different Lamina ſeldom falling exactly even, but hanging a little over one another, and making an unequal edge; they are of a dull and diſagreeable colour, a duſky brown with a conſiderable admixture of blueiſhneſs in it, and are much leſs bright, but yet more pellucid than many others of this order; they are very heavy in the maſs, and like the others will neither give fire with ſteel, nor at all ferment with Aqua Fortis. They feel the effect of fire much ſooner than moſt of the other ſpecies, and pretty readily calcine to a pale reddiſh grey loſing all their tranſparence.

Examin'd by the Microſcope they appear of a rude and unequal ſurface, very full of ridges and cavities, and of a much leſs gloſſy or glittering appearance than moſt of the others, but more tranſparent, and of a not diſagreeable blueiſh colour: It is very rare to find in this ſpecies any open cracks, even at the extreameſt edges of the plates, but they ſeem ſwell'd into a thickneſs, and laid very cloſely, and join'd very firmly together: It ſeems very plain from the whole appearance and properties of this ſpecies, that there is a mixture of cryſtal with the Talc, and to this it owes its tranſparence, hardneſs, more perfect coheſion in the maſs, and the other differences it has from the purer Talcs.

It is found in conſiderable plenty in ſome parts of Germany, and has been ſometimes ſeen on the Yorkſhire ſhores, but no where elſe that I have heard of in England.

2. *Elaſmis hebes pallide rubens, ſquammis variis.*
Dull pale-red Elaſmis, with various ſiz'd ſcales.

This is a ſpecies ſomewhat opake and dull for a foliaceous Talc; and is uſually found in maſſes of a conſiderably firm, compact and ſtrong texture, tho' very coarſe and unequal in their ſtructure; they have uſually very rough, ragged and unequal ſurfaces, are various in ſhape, but uſually ſomewhat tending to round, and ever compreſs'd and flat; and are from two, to ſix or eight inches broad; they are compos'd of a vaſt number of variouſly ſiz'd ſcales, laid very cloſely together, and falling uſually in a very even and beautiful order over one another: theſe ſeem at firſt view to make up the whole maſs, but if the lumps be more attentively examin'd, there will be found among, under and between them, a very large quantity of a more opake ſubſtance, evidently of the ſame nature with that of the flakes, only falling together without that beautiful arrangement, and ſerving as a tolerably firm cement to them; the flakes of both this and the former ſpecies, are indeed frequently found as the reſt of the Talcs at times are, either looſe among the ſtrata of ſand or earth, or immers'd in the ſtrata or nodules of ſtone, but this is its natural, and its uſual and common appearance; the flakes in this ſpecies are extreamly various in ſhape and ſize, of no tendency to any determinate figure; and ſome are of a ſixth of an inch broad, while others are as ſmall as any thing can be to be viſible. They ſeem of very ſmooth and even ſurfaces, and are ſoft to the touch as the Venetian Talc, to the nature of which, they ſomewhat tho' coarſely approach; they are made up of a vaſt number of thinner flakes, and are very eaſily ſplit and ſeparated into them; they bend but badly, often cracking and breaking in the attempt, and are leſs elaſtic even than almoſt any other kind; they are ſeldom quite flat or plain, and often extreamly and very beautifully wav'd, bent, and curl'd: They are of an extreamly pretty pale red, a little deeper than what we uſually call fleſh-colour, but have but very little brightneſs, and ſcarce any tranſparence; the maſſes of them are not very eaſily broken, and when they are, they uſually part in rugged and uneven ſurfaces; they are conſiderably heavy, they will not give fire with ſteel, nor at all ferment with Aqua Fortis, and after ſome time burn to a pale whitiſh grey.

Examin'd by the Microſcope the flakes appear compos'd of fewer, and thoſe thicker ſcales than thoſe of many other ſpecies, and the colour is ſeldom equally diffus'd thro' them, but uſually lies in ſpots and blotches; they have ſomething of the brightneſs of the former, but ever leſs of it by far than that. The intermediate matter, is evidently of the ſame kind with the reſt, and often emulates a plated or flaky ſtructure, tho' in a very confus'd and irregular manner.

Nothing can be more natural than to conceive, that if the matter of the foliaceous Talc owes its concretion into that regular form, to its own perfect purity, and its not too haſty concretion, if loaded with Earth, as like all other ſubſtances in the Foſſil world, it cannot but be allow'd liable to ſuch accidents, that alone might eaſily prevent its acquiring that elegant and regular form; and if we add to this, the eaſily poſſible accident of a more haſty coaleſcence, from the too ſudden abſence of the fluid that before divided its particles, which we find has occaſionally happen'd to almoſt all the other ſpecies of Foſſils, we ſhall eaſily ſee the origin of the irregular maſſes of this and the former ſpecies; and inſtead of being ſurpriz'd at finding theſe ſo irregularly form'd, we may more properly wonder, that we don't find more of the ſpecies more frequently ſo.

This is very common on the ſhores of Lincolnſhire, and in Mendip Hills often it is thrown up in ſinking for coal.

SECT. II. ELASMIDES with large ſpangles.

1. *Elaſmis lucida, ponderoſiſſima, aurantia, bracteis craſſis. Heavy, ſhining, orange-colour'd Elaſmis, with thick flakes.*

THIS is a very ſingular ſpecies, and tho' greatly different from all the reſt, is not without its beauty; it is uſually found in rude, irregular, and often manifeſtly broken maſſes of an extreamly rough and unequal texture, yet cohering very firmly in all the commiſſures of the plates, and thence very firm and compact; they are of a very unequal ſurface, plain, ſmooth and even in ſome parts, and ridg'd, crack'd and plated in others, as the flat ſides or edges of the tables happen to preſent themſelves to the view; their ſhape is perfectly irregular, but very rarely any thing approaching to roundneſs; the orbicular figure, I believe, in many of theſe is merely adventitious, and the effect of their being roll'd about with the water againſt other harder bodies; and in confirmation of this, I have ever obſerv'd ſuch maſſes as have been found on the ſea ſhores, to be in general more rounded than thoſe thrown up in digging; but it is plain enough, that tho' a body of ſomething like a ſmooth ſhape, might by this rolling about, be eaſily enough rounded, and made more ſmooth, yet any one who will obſerve the high ridges and prominences in this ſpecies, will naturally determine, that it muſt rather be broken, as we indeed frequently find it, than ſmooth'd or rounded by being beaten againſt harder bodies.

Its ſize in theſe maſſes is very various and uncertain, ſome of them being found of three, four, or five inches diameter, others of ſix or eight, and others of little more than one. Theſe are compos'd of a ſmall number of plates in compariſon of moſt of the other kinds, and thoſe are very large, thick and firm, and cohere firmly to one another, without the intervention of ſtony, earthy, or any other matter by way of cement; they are rang'd in a very uncertain and diſorderly manner, and come into contact in all angles and directions, not unfrequently leaving ſmall cavities in the inner parts of the maſſes; they are uſually the largeſt and thickeſt of all the flakes of this ſort of bodies, and are of wrinkled, ridg'd or tranſverſely ſtriated ſurfaces; the ſtriæ, however, in theſe, are not regularly or exactly tranſverſe, as in the former ſpecies, but run a-ſlant upward or downward, tho' there never are any truly longitudinal or perpendicular; and they have uſually many ſmaller lines running in form of little flaws in different angles between them; they are ſomewhat hard and harſh to the touch, and are compos'd of only a few flakes, each of conſiderable thickneſs, but difficultly and irregularly ſplitting or parting from one another, and uſually breaking in the attempt, and falling off at ſome of theſe tranſverſe ſtriæ; they are flexile and elaſtic, but in a leſs degree than almoſt any other ſpecies, and are always eaſily broken tranſverſely, by bending three or four times backward and forward, they are never at all wav'd, bent or convoluted; and are of a fine deep orange colour, very bright and gloſſy, but of no great tranſparence; the maſſes of them eaſily break or ſhatter to pieces by a ſmall blow, but they never ſeparate at the commiſſures, but in the ſubſtance of the flakes, ſplitting irregularly thro' the divers ſets of them, and therefore always giving a very uneven, but very bright ſurface; they are moſt remarkably heavy, they will not at all give fire with ſteel, but give a ſlight and momentary fermentation in Aqua Fortis, which makes no alteration in the flakes, nor at all injures their ſtructure.

In the fire the whole maſs very readily calcines to a pale yellowiſh white, with ſome faint admixture of freſh colour.

Examin'd by the Microſcope it appears conſiderably opake, and the moſt crack'd and flaw'd of all the ſpecies; it is extreamly different from them all in the thickneſs of its plates, and is more perfectly join'd at the commiſſures of them, than the bodies of this kind uſually are.

It is very frequent on the ſhores of rivers in all parts of the Eaſt Indies, and no where elſe that I have heard of in the world; its ſingular ſtructure and great weight, made it worth ſome pains to try to what it ow'd them, and by many experiments I found, that it contained a ſmall proportion of ſpar mix'd in the body of the Talc, and not eaſily ſeparable from it, and ſome lead, with a ſmall mixture of ſilver.

2. *Elaſmis*

2. *Elaſmis lucidiſſima purpuraſcens ſquammis craſſioribus.*
Bright, purple Elaſmis, with thick ſcales.

This is an extreamly bright and elegant ſpecies, and is much eſteem'd in the Eaſt Indies for its medicinal virtues, Dr. Woodward, V. 2. p. 7. of his foreign Foſſils, deſcribes this ſpecies, which he received from Mr. Bulkely, with an account of its being eſteem'd good in Arthritic Pains and Vertigoes; but either thoſe gentlemen miſtook the ſtone, or the people have chang'd their notions about its virtues, for it is now us'd among them only as a Diuretic, and is good againſt the Stone.

It is uſually found in extreamly rough, rude and coarſe maſſes, but of a tolerably firm and compact texture, of very rugged and unequal ſurfaces, of no determinate figure, and from one, to three, four or five inches in diameter; theſe are compos'd of a ſmall number of very large and thick flakes, very firmly cohering to one another, without the intervention of any other matter; they are, however, very oddly and wildly laid together, and come into contact, ſome in their flat ſides, ſome in their tabulated edges only; cohering, ſome by their whole ſurfaces, others only by a part of their ſides; they come nearer being of a determinate ſhape than the flakes of any other ſpecies, being all oblong, and moſt of them angular; their ſurfaces are very ſmooth, polite and gloſſy, but mark'd with a vaſt number of tranſverſe lines, cracks and flaws, with others narrower and ſmaller, interſecting them at various angles; they have ſomething of the ſoftneſs of pure and genuine Talc to the touch, but much leſs of it than the Venetian, and other ſoft kinds; they are each compos'd of a ſmall number of other conſiderably thick flakes, which may be pretty readily ſeparated from one another, by ſplitting, but they ſeldom come off whole, uſually breaking acroſs at ſome of the tranſverſe cracks before mention'd; they are leſs flexile and elaſtic than many other kinds, and bear bending, almoſt the worſt of any, frequently breaking tranſverſely with a little force; they are ever diſpos'd evenly and flatly in the maſſes, and never in the leaſt bent, wav'd or convoluted, as the thinner flakes in theſe bodies uſually are; they are of an extreamly elegant colour, which, with their brightneſs, gives them a beauty little inferior to ſome of the gems; they are always purple, and that uſually in the ſame degree, very deep, and approaching to the colour of the deepeſt Amethyſts, but always with ſomething of a coppery tinge, and are very conſiderably tranſparent, the whole maſs, tho' of ſome inches diameter, being in many places pellucid, if held up againſt a ſtrong light. The maſſes fall into ſhatters by a ſlight blow from a hammer, and ſhew very irregular, but very bright and beautiful ſurfaces.

It will not at all give fire with ſteel, nor ferment with Aqua Fortis, and after ſome time calcines to a pale fleſh colour'd opake maſs.

Examin'd by the Microſcope the flakes are found extreamly flaw'd, and full of opake lines, but the intermediate ſpaces very elegantly colour'd, and finely tranſparent. The ſeveral flakes ſeem very firmly join'd together, and the maſs is ever ſeen to have broken thro' the bodies of the ſeveral flakes, not in the commiſſures or joinings of them: There is no doubt from the whole appearance of this ſpecies, but that a ſmall quantity of cryſtal has mix'd itſelf in it at the time of its original formation; and that tho' it be not in ſufficient quantity to manifeſt itſelf to the trial by ſteel, yet it determines the whole to ſomething like its own figure, and makes it more ſhattery, and leſs flexile and elaſtic than pure Talc.

It is frequent on the ſhores of rivers in all parts of the Eaſt Indies.

The antients ſeem to have been very well acquainted with the various kinds of foliaceous Talc; Pliny tells us, that the Specularis Lapis was eaſily ſplit into thin flakes; this he mentions as having been ſometimes found of great breadth; but he tells us alſo of other kinds that were ſmaller and immers'd in the ſubſtance of a ſtone.

The word Talc has been us'd by different authors, however, as expreſſing different ſubſtances, Averrhoes and Avicenna make it the name of the Samius Aſter, or that ſpecies of Samian Earth before deſcrib'd, which has uſually the fragments of Selenitæ in great abundance immers'd in it; the ſame Avicenna, however, ſeem'd to know very well, that it alſo expreſs'd a peculiar Foſſil of a plated or foliaceous texture, ſince he in another place deſcribing the flaky, yellow Orpiment, expreſly ſays, that it is as it were a yellow kind of Talc, Talkaſafar: The ſame author indeed ſeems to acknowledge it as a word of equivocal ſignification, and according to the cuſtom of his time, ſometimes makes it expreſs the Samian Earth, with flakes like thoſe of Talc, and in thoſe leſs accurate times eaſily miſtaken for Talc in it, and ſometimes the pure foliaceous Talc as evidently as in the now cited inſtance.

FOSSILS

NATURALLY and eſſentially ſimple, not inflammable nor ſoluble in water, of a regular ſtructure, but no determinate figure.

Series the ſecond.

Claſs the ſecond.

FIBRARIÆ.

Foſſils compos'd of parallel fibres, or filaments, uſually remaining ſo diſtinct, as to preſerve in the whole maſſes, a thread-like texture; but ſometimes uniting ſo as to form plates or flakes reſembling thoſe of the Talcs: in external appearance bright, and in ſome degree tranſparent, not giving fire with ſteel, nor fermenting with or ſoluble in Acid Menſtrua.

Of this claſs are two orders, and under theſe four genera.

Order the firſt.

Fibrariæ compos'd of filaments, rang'd perpendicularly in the maſs, not flexile nor elaſtic, and readily calcining in the fire.

Order the ſecond.

Fibrariæ compos'd of filaments, rang'd horizontally in the maſs, flexile and elaſtic, and not calcining in the fire.

FIBRARIÆ.

Order the firſt.

Genus 1. TRICHERIÆ. *Fibroſe bodies not elaſtic, and compos'd of ſtrait and continuous filaments.*

Genus 2. LACHNIDES. *Fibroſe bodies not elaſtic, and compos'd of ſhort and abrupt fibres.*

FIBRARIÆ.

Order the ſecond.

Genus 1. ASBESTI. *Fibroſe bodies flexile and elaſtic, compos'd of ſtrait and continuous filaments.*

Genus 2. AMIANTHI. *Fibroſe bodies flexile and elaſtic, compos'd of ſhort and abrupt filaments.*

SERIES II.

CLASS II. ORDER I. GENUS I.

TRICHERIÆ.

FIBROSE bodies not elaſtic, and compos'd of ſtrait and continuous filaments. The bodies of this and the following Genus are call'd by authors fibrous Talcs.

SECT. I. TRICHERIÆ, compos'd of larger and broader filaments.

1. *Tricheria albida minus lucida filamentis craſſiuſculis brevioribus. Quæ Gypſum ſtriatum authorum.*

Whitiſh, leſs gloſſy Tricheria, with ſhort thick filaments, the ſtriated Plaiſter-Stone of authors.

This is a ſomewhat coarſe, harſh and rough ſpecies: of a rude, irregular and unequal ſurface, and lax, friable texture; it is found in maſſes of various ſize, from one to twelve, or eighteen inches over, but always broad and flat; its thickneſs being uſually but of about an inch and half, and in the very broadeſt pieces, ſeldom much more than two inches; it is of a rude, irregular and wrinkled ſurface, and is compos'd of conſiderably large and coarſe longitudinal filaments, running uſually very evenly thro' the maſs, each being of the length that the thickneſs of the maſs requires it ſhould be, and running thro' it without interruption; it is eaſily fiſſile in a perpendicular direction, that is, parallelly to the arrangement of theſe filaments; but they are themſelves ſo brittle as ſeldom to come off whole, unleſs in large congeries. It is of a dull and dead whitiſh colour, ſometimes with an admixture of greyiſh, and often of reddiſhneſs eſpecially near its ſurface; its filaments when ſeparated, appear whiter and more gloſſy, and are a little flexile, but not at all elaſtic; they adhere but looſely to one another, and have, when examin'd ſingly, a ſlight ſhare of tranſparence; they break acroſs with equal eaſe in all places, and have no viſible tranſverſe ſtreaks; the whole maſs is conſiderably heavy.

It will not at all give fire with ſteel, nor ferment with Aqua Fortis, but very readily calcines to a perfect and pure white.

Examin'd by the Microſcope, its filaments appear each compos'd of a vaſt number of extreamly minute, but ſtrait, even and flattiſh fibres, carry'd without interruption thro' them, as they thro' the maſs, and ſubject to no croſs ſtreaks, in the whole; each filament of the maſs very much reſembles in ſtructure, ſubſtance and conſtitution, a flake of one of the Columnar Selenitæ with longitudinal fibres; that body ſeeming on experiments as well as appearance much of the nature of theſe ſtriated of fibroſe Bodies, only having its conſtituent fibres, inſtead of theſe ſmall and narrow filaments, rang'd into broad and even plates like thoſe of the foliaceous Talcs.

It is found in clay and marle pits, among the ſtrata of gravel, and in the fiſſures of ſtone; it is common in Yorkſhire, and is both there and in many other places, call'd Plaiſter-ſtone; and burns into a very good plaiſter.

It is ſold in our Druggiſts ſhops alſo, under the name of Engliſh Talc, and us'd when ſlightly burnt, for the cleaning of ſilver lace.

The Germans uſe it in the fluxing the ſulphureous ores of metals, and call it as well as every other foſſile that they employ for the ſame purpoſe, Spaad or Spaat.

Gypſum and Spaad have, in ſhort, been generally look'd upon as determinate and ſpecifick, if not generical names of foſſils; but whoever will be at the pains of enquiring thoroughly into the matter, will find that with the Germans, every foſſile is Spaad that will readily calcine and promote the fuſion of their ſulphureous ores and in places where they manufacture the plaiſter of Paris, as it is uſually call'd, every foſſile that will burn into that ſubſtance, is call'd Plaiſter-ſtone, or Gypſum. As there is one diſtinct Genus of foſſils, however, which is more than all the reſt appropriated to this uſe, and which has been hitherto confounded very improperly with the foliaceous Talcs, or theſe fibroſe Bodies which are of a very different ſtructure: and not known by any determinate name the ſcientific reader will pardon my having apply'd the name Gypſum to that ſubſtance alone, and made the word under that ſtrict and determinate ſenſe ſtand for the future as a generical name.

2. *Tricheria albido-ſtraminea, lucidiſſima, filamentis latioribus, continuis, rectis.*

Gloſſy, yellowiſh-white Tricheria, with broad, ſtraight and continued filaments.

This is a very bright and very elegant ſpecies. It is of an extreamly cloſe, even and regular ſtructure, and moderately firm and compact; it is found in ſmall but thick flat maſſes, and is of a very beautiful ſtraw colour, or very pale yellow: Its flat ſurfaces, form'd by the ends of its filaments, are ſomewhat rough and uneven, but its edges where the ſurfaces and joinings of the filaments to one another make the ſuperficies, are, without exception, the moſt ſmooth, bright and gloſſy of thoſe of all the bodies of this Genus; it is perfectly irregular and uncertain in ſhape, but as the others are generally broad and flat, this on the contrary is often thicker than either long or broad; it is ſeldom found exceeding three inches over, either way, and is uſually of at leaſt that in thickneſs; it is compos'd of very elegantly continued filaments, each running in a perfectly ſtrait direction thro' the ſubſtance of the maſs, and giving, by its flat and regular ſurface, a broad, even, gloſſy line through it, of a congeries of which plac'd cloſely and evenly together the whole is compos'd; it is very eaſily and very regularly fiſſile, the filaments parting very evenly from one another, but they are ſo brittle, that unleſs a large bundle of them be ſeparated together they cannot bear their own weight, or be taken off without breaking; when ſeparated they are very little flexile and not at all elaſtic; their ſurfaces are every way, even where they adher'd to one another, extreamly bright and gloſſy, and mark'd with no viſible tranſverſe ſtriæ, tho' with ſome faint appearance of longitudinal ones, eſpecially in ſuch parts where the filament has been moſt bent in the taking it off from the maſs; the maſs is of conſiderable weight and moderately hard.

It will not give fire with ſteel, nor ferment with Aqua Fortis, but calcines very freely to a pure white.

Examin'd by the Microſcope, after a little bending, the filaments appear very elegantly compos'd of extreamly ſlender fibres, bundled into ſeveral Faſciculi, and rang'd evenly together, each running without interruption the whole length of the filament. It is the moſt pellucid of all the fibroſe Talcs.

It is found in the ſtone pits of Northamptonſhire, filling perpendicular fiſſures, and ſometimes in ſmall maſſes in the clay-pits, and among the gravel in the ſame county.

3. *Tricheria lucidiſſima, alba, filamentis latiſſimis, foliaceis.*

Bright, white Tricheria, with broad foliaceous filaments.

This is a very ſingular and elegant ſpecies, and, above all others, ſhews the great analogy which there is between theſe bodies and the plates of the Selenitæ, tho' no author has happen'd before to obſerve it; it is a very rude and irregular, tho' extreamly beautiful maſs, and is of a looſe, friable and ſhattery ſtructure; it is found in very large, broad and conſiderably thick maſſes of a perfect and pure white, and where freſh broken, of a gloſs and brightneſs greatly ſuperior to that of any other Tricheria: Its horizontal ſurfaces are very rude, rough and irregular, and much more lucid and gloſſy in ſome parts than in others; there are indeed irregular ſpots on theſe, frequently of the brightneſs and almoſt the tranſparence of cryſtal: theſe are form'd of the ends of the broader filaments, which are gradually collected in cluſters in the body of the maſs, and the reſt of the ſurface, tho' very fair and gloſſy, is greatly inferior to theſe lucid ſpecks; its ſides where the edges of the filaments come in ſight, are very rough, unequal and ridg'd, and are in ſome parts compos'd of very broad and extreamly bright filaments, in others of much narrower and duller; and throughout the whole maſs theſe are ever of broader and brighter ſurfaces toward the top or horizontal plane, according to the natural ſite of the maſſes in the earth, than toward the bottom. The maſſes are of no determinate ſhape, but are often found very large, many of them are of twelve or fourteen inches broad, and of two or three inches in thickneſs; they are all compos'd, be the thickneſs ever ſo great, of ſingle, continued and uninterrupted

interrupted filaments; theſe are alſo ever laid evenly, and run in a perfectly ſtrait perpendicular direction thro' the maſs: they are of a very remarkable figure, for as moſt of the filaments which conſtitute the maſſes of the other ſpecies are of equal breadth, throughout theſe are ever greatly broader at the top than the bottom of the maſs; and often extend themſelves there to fine and beautifully even and gloſſy flakes of half an inch or more in breadth, and thoſe fiſſile into extreamly minute ſcales, like thoſe of the foliaceous Talcs, or Selenitæ; from the laſt of which, if ſeparated from the maſs, they are no way diſtinguiſhable; theſe cohere but very ſlightly one with another, and of conſequence the maſſes are very fiſſile; the filaments readily ſeparate into flakes which are not at all flexile, and ſcarce at all elaſtic; they are of perfectly ſmooth and gloſſy ſurfaces while in the maſs, but being a little bent when ſeparated from it they quickly appear ſtriated longitudinally, and if attentively view'd, are not without ſome ſlender ſtreaks paſſing obliquely acroſs them; they break pretty readily in a longitudinal direction at theſe long ſtreaks, and when in very thin plates without much difficulty will ſeparate alſo at the tranſverſe ones; the narrower pieces parted off longitudinally are alſo uſually brittle, and always break exactly in one or other of theſe ſtreaks; that part of the maſs where theſe broad filaments are, is tolerably compact, firm and hard, but its lower part where they are narrower is more looſe and ſhattery, in ſome places very greatly ſo, and is conſiderably dull and deſtitute of ſplendor, while theſe broad flakes have all the brightneſs of the fineſt of the foliaceous Talcs, or even of pure cryſtal; it is heavier than moſt of theſe bodies.

It will neither give fire with ſteel, nor ferment with Aqua Fortis, but calcines very freely to a fine white plaiſter.

Examin'd by the Microſcope, its flakes, after bending, are diſcover'd to be compos'd of ſmall faſciæ of oblong and extreamly ſlender filaments, all running in a perfectly ſtrait and even longitudinal direction; and part of theſe faſciæ being diſturb'd and their conſtituent filaments ſeparated, and part remaining entire and unhurt, the whole flake has uſually a ſtriated look, the diſturb'd faſciæ being whitiſh and opake, the others perfectly pellucid: the ſtriæ that croſs the plates are very minute and ſlender, but here appear very diſtinct and numerous; and the whole has perfectly the figure, texture and appearance of a plate of one of the fine Selenitæ, and is indeed by no means to be diſtinguiſhed from it.

I have before obſerv'd, that even in the coarſer Tricheriæ, when nicely examin'd, a great analogy might be found with the Selenitæ, but here is a proof beyond all doubt of their being almoſt perfectly of the ſame ſtructure, a maſs which appears a plain ſtriated Tricheria at its bottom, and as plain Selenitæ in fine broad flakes at the top; if the middle part of theſe maſſes be examin'd, it will be found, that the fibres forming the narrower filaments, as they riſe toward the upper ſurface of the maſs, coaleſce into theſe broad flakes.

I obſerv'd this in conſiderable plenty in the alabaſter-pits of Derbyſhire, but have not met with it, or indeed heard of it in any other part of the kingdom.

SECT. II. TRICHERIÆ, compos'd of finer and ſmaller filaments.

1. *Tricheria carnea, minus lucida, filamentis continuis anguſtioribus.* *Fleſh colour'd, leſs gloſſy, fibroſe Talc, with continued narrow filaments.*

THIS, tho' leſs bright than many other of the bodies of this claſs, is a very regularly conſtructed and elegant Foſſil; it is a fine, ſmooth and equal body, of a cloſe, compact and firm texture, and is uſually found in large and thick tho' flat maſſes; it is throughout, and in all parts, very equally of an elegant pale fleſh colour; its horizontal ſurfaces form'd by the ends of its fibres, are ſmooth and even but not gloſſy, and its ſides form'd by the edges of the ſame filaments, are generally tolerably ſmooth, alſo, not ridg'd and furrow'd as thoſe of the broad filamented kinds, and uſually tolerably free from foulneſs. It is of no determinate figure, but uſually rather rounded than angular at its extremities, and is of various ſizes, from three or four to ten or twelve inches broad, and of different thickneſſes in proportion, ſome pieces of it being found of five inches thick; yet in even the thickeſt of theſe, the filaments of which the whole is compos'd, are ſingle, and each runs thro' the maſs continu'd and without breach or interruption; they are uſually ſtrait in the thinner ſpecimens; but in thoſe where there are neceſſarily ſo very long, they are generally a little bent towards their middle; the maſſes are very fiſſile, and the filaments ſeparate readily from them in ſmall congeries, but can ſeldom be preſerv'd intire they are ſo very brittle; they are very ſmooth and gloſſy, mark'd with no tranſverſe ſtreaks, and break acroſs with equal eaſe in all parts; they have ſome brightneſs when thus ſeparated, but at beſt very little tranſparency; their ſlight coherence makes the maſſes compos'd of them but lax and friable, and they are moderately heavy.

It will not give fire with ſteel, nor ferment with Aqua Fortis, but calcines very freely and in a very little time.

Examin'd by the Microſcope, the filaments appear of a rounder or leſs flatted figure than any of thoſe of the former, and ſtriated longitudinally, but with interrupted and complex ſtreaks; theſe are the ſeveral fibres the filaments are compos'd of, and are very ſlender and minute, but ſhort and crooked: tho' the filaments therefore are continued thro' the body of the maſs, they are in this ſpecies compos'd of much ſhorter bodies, and thence very probably is their extream brittleneſs.

This is found in many parts of Yorkſhire, and is worth enquiring after in other counties, ſince it burns with very little trouble into a very good plaiſter.

2. *Tricheria albida, hebes, filamentis breviſſimis, continuis, anguſtis.*
Dull, white Tricheria, with very ſhort continu'd narrow filaments.

This is a very ſingular and extraordinary ſpecies, and not more different from the reſt in its texture, than in the manner in which it is found lodg'd: It is of a very compact and firm texture, and conſiderably fine, ſmooth and even, and is not found in large maſſes, as the other ſpecies uſually are, but lodg'd in the form of white veins in other ſubſtances, and uſually making a multitude of ſlender and beautiful white ſtriæ, in a red indurated Marle, the ſtrata of which it is uſually found in. It makes in this, veins exactly like thoſe of the Aſbeſtos, hereafter to be deſcibed in the Angleſea marble; the ſurfaces made by the ends of its filaments are not eaſily ſeen, it is generally ſo firmly attach'd both ways to the Marle, but its others are found very ſmooth, even, and gloſſy; its fibres are various in length, they are all continued without interruption thro' the veins; and theſe are from the breadth of an horſe hair, to half an inch, beyond which I have not ſeen any. It is not eaſily fiſſile, nor ſplits in a perfectly ſtrait direction; the filaments uſually not running direct, but a little obliquely; when ſeparated, they are ſcarce at all flexile, and not at all elaſtic, of a very dull and duſky white in colour, of leſs ſmooth and gloſſy ſurfaces than thoſe of moſt other kinds, and are very viſibly ſtriated both lengthway, and acroſs; the tranſverſe ſtreaks running a little obliquely; tho' longitudinally and exactly even according to the direction of the filaments in the maſs; they are leſs brittle than the filaments of moſt other ſpecies; and from that, and their firm coheſion together, make the whole much more firm and ſtrong than moſt of the others.

It is moderately heavy, and will neither give fire with ſteel, nor ferment with Aqua Fortis, but calcines pretty freely to a pure white.

Examin'd by the Microſcope, its ſeparated filaments, which are themſelves very fine and ſlender, appear compos'd of fibres of an almoſt inconceivable ſmallneſs, running ſtrait along the body of the filaments, but interſected by many obliquely tranſverſe ſtreaks, looking like ſo many commiſſures; and as if each fibre was indeed made up of ſeveral ſhorter fibres join'd at theſe places; if it be ſo, it is an amazing thing, that the ends of ſuch extreamly minute bodies ſhou'd be every where ſo perfectly made to meet with one another.

It is frequent in the pits of red Marle, both in Derbyſhire and Staffordſhire, and is never found otherwiſe than in veins in the hardeſt parts of the Marle.

3. *Trickeria albido-ſubvireſcens, lucida, filamentis continuis, rectis, anguſtioribus.*
Greeniſh-white, gloſſy Tricheria, with ſtrait, narrow and continu'd filaments.

This is an extreamly elegant and beautiful ſpecies; it is of a perfectly even regular ſtructure, and very firm, compact and hard. It is found in very large, but uſually thin maſſes, and is throughout of a very pleaſing colour, a fair gloſſy white, with a faint admixture of greeniſhneſs; its horizontal ſurfaces are very even, and ſomewhat gloſſy; and its ſides made of the edges of its conſtituent filaments, extreamly even and regular, and are ſeldom foul'd with earth, tho' every where contiguous to it in the ſtratum. It is of various breadths, from two to twelve or fourteen inches, but ſeldom exceeds an inch and half in thickneſs; when broken, it looks extreamly bright and gloſſy, and is ſeen to be compos'd of a moſt beautiful and regular arrangement of parallel narrow filaments, each continued thro' the whole maſs, and of a length proportion'd to its thickneſs: theſe are not only never abrupt in any part of the maſs, but they are never ſeen in the leaſt diſtorted, convoluted or inflected, but all run in perfectly ſtrait lines, thro' the ſubſtance of the maſs, which is therefore always regularly fiſſile into very ſmall congeries of theſe; but is ſo firm and compact, from the regular order, and cloſe contact and coheſion of theſe even filaments, that it does not ſplit ſo eaſily as moſt of theſe bodies do; its ſeparated filaments are extreamly bright, gloſſy and tranſparent, and not at all flexile or elaſtic: they appear perfectly colourleſs when ſingle. They may ſometimes be diſcover'd to be ſtriated both longitudinally and tranſverſly, with fine minute ſtreaks; and if bent and cruſh'd, will ſeparate either longitudinally into their conſtituent fibres, or tranſverſly, according to the direction of the ſtreaks. The whole maſs is very bright on the ſurfaces where freſh broken, and if held up againſt a good light, appears conſiderably tranſparent.

It is very heavy, and will neither give fire with ſteel, nor ferment with Aqua Fortis, but calcines very freely and eaſily into a pure white.

Examin'd by the Microſcope it appears the moſt regularly conſtructed of all the bodies of this genus; the minute fibres which compoſe the viſible filaments, are all as ſtrait, and as regularly rang'd as they; it is, however, a queſtion, whether theſe are continu'd thro' the whole length of the filaments, or whether the tranſverſe ſtreaks are not ſo many commiſſures, where they are join'd by their ends one to another: If this be the caſe, the perfect ſtraitneſs of the compound fibres is extreamly wonderful.

It is a ſcarce ſpecies, but is ſometimes found in the Marle pits in Derbyſhire, where many of the others are found. I have alſo ſeen ſmall maſſes of it on the Yorkſhire ſhores, and once or twice in the gravel pits of Northamptonſhire among the pebbles.

SERIES II.

CLASS II. ORDER I. GENUS II.

LACHNIDES.

FIBROSE bodies, not elaſtic, and compos'd of ſhort and abrupt fibres.

SECT. I. LACHNIDES compos'd of larger and broader filaments.

1. *Lachnis albido-carnea, lucida, filamentis latioribus, inflexis, & abruptis.*
Fleſh-colour'd, pale, gloſſy Lachnis, with abrupt, broad and crooked filaments.

This is of a ſomewhat coarſe and rude ſtructure, but much ſofter to the touch than many of theſe bodies, and conſiderably more firm, compact and cloſe in its texture.

ture. It is found in very large, broad and flat maſſes, of a whitiſh fleſh colour; they are never without ſome tinge of red, yet never have it in more than a very ſlight degree; it is of a very ſmooth, even, and ſomewhat gloſſy ſurface on its horizontal planes, which are the ſurfaces form'd by the extremities of its fibres, and in its natural poſition in the pits, are its top and bottom; its ſides which are form'd of the edges of the ſame filaments, are generally rough, made up of ridges and cavities, and conſiderably foul'd by the earth of the ſtratum. Theſe maſſes are of no determinate ſhape or figure, and are very various in ſize, ſome of them being found to eight or ten inches broad, and uſually from one to four inches in thickneſs: They are compos'd of an irregular arrangement of conſiderably broad and flat filaments, not running ſingly thro' the whole thickneſs of the maſs, but laid in oblique angles, continually interſecting each other, tho' ſo clearly compacted, as never to admit earth or other extraneous matter between them, and often ſo ſhort, that three or four ranges of them are requir'd to go thro' the maſs; tho' more uſually two orders of them meeting near the center, compoſe even the thickeſt ſpecimens; theſe fibres, tho' lodg'd obliquely in the maſs, are, however, beſide that in their own ſtructure, bent and wav'd, tho' that in no great degree: The maſſes are very eaſily fiſſile perpendicularly, or according to the direction of the filaments; and theſe, when ſeparated, which may eaſily be effected in ſmall congeries, and in their whole length are not at all flexile or elaſtic; they adhere pretty cloſely and firmly together at their ſides, and are of very ſmooth and gloſſy ſurfaces, plainly ſtriated longitudinally, but not at all ſubject to tranſverſe ſtreaks in any part; and are very beautifully tranſparent. By their cloſe arrangement, and firm coheſion one with another, the maſſes they conſtitute are leſs friable than thoſe of many of the other fibroſe bodies; they are alſo conſiderably heavy, and will neither ferment with Aqua Fortis, nor give fire with ſteel, and calcine but ſlowly, tho' to a perfect whiteneſs.

Examin'd by the Microſcope, the filaments appear compos'd of very minute and extreamly regular and beautiful fibres, arrang'd all into faſciæ, or ſmall bundles, and forming narrow flakes, or plates of a great brightneſs and tranſparence; theſe flakes are the broad filaments which we diſtinguiſh by the naked eye, as the conſtituent parts of the maſs; but thus view'd, they appear extreamly analagous to the plates of the Selenitæ; and, like thoſe, are often perfectly pellucid and free from ſtreaks, till their fibres, or faſciæ of fibres, are ſeparated or diſorder'd, by bending the flake or broad filament, and then they diſcover themſelves exactly as in the various Selenitæ. The Selenitæ have been uſually, tho' very erroneouſly, ſuppos'd to be of the ſame ſubſtance of the foliaceous Talc, had they been accounted of the ſame with theſe bodies; the Microſcope, and all the teſts by fire and otherwiſe, prove, that the ſyſtem had been extreamly juſt, tho' much leſs countenanced by the external appearance of the two bodies.

This is found in the Marle pits of Derbyſhire and in ſome other places, but its burning more ſlowly into plaiſter makes it little eſteem'd.

2. *Lachnis albido-ſubvireſcens, lucida, filamentis latioribus, obliquis, interruptis.*

Greeniſh-white, gloſſy Lachnis, with broad interrupted and oblique filaments.

This is another very elegant ſpecies of the fibroſe bodies, and tho' leſs regularly conſtructed than the former, is very obſervable in the manner of the interruption of its filaments. It is a rude, rough and irregular maſs, of a looſe friable ſtructure, uſually found in large, broad, and thick maſſes, and of a duſky greeniſh white; its horizontal ſurfaces are but very uneven, rough and rugged, and its ſides compos'd of broad filaments, foul'd with, and interrupted by the earth of the ſtratum, where it it is found depoſited; it is of no determinate figure, and in ſize exceeds moſt of the other ſpecies, being not unfrequently found of near two feet broad, and ſix or ſeven inches thick. It is compos'd of tolerably bright and gloſſy, but very broad and irregularly rang'd filaments, which are not continu'd in ſingle lengths thro' the whole thickneſs of the maſs, but ſhort, and not join'd to, or interwoven with one another at their ends, but ſeparated tranſverſely into ſeveral ranges or orders, by horizontal plates, or narrow veins, of a greeniſh white Marle, the ſame with that of the ſtratum in which they lie; theſe veins of earth do not always lie in an even horizontal direction, but frequently croſs the maſs obliquely, in ſhort ſtreaks, and oblique directions; the filaments themſelves are very broad and ſhort, and do not run perpendicularly in the maſs, but are plac'd obliquely both to the general maſs, and to one another; the whole is eaſily fiſſile, and its ſeparated filaments very pellucid, but not at all flexile or elaſtic; they hold but ſlightly together, and eaſily ſeparate almoſt ſingly in their whole length; they are of very ſmooth ſurfaces, and mark'd with no tranſverſe ſtriæ: The whole maſs is friable and crumbly, and of conſiderable weight.

It will not give fire with ſteel, nor ferment with Aqua Fortis, but freely, and in a little time, calcines to a fine white plaiſter.

Examin'd by the Microſcope it appears but looſely connected in its ſeveral filaments, and thoſe compos'd of ſomewhat larger and coarſer fibres than thoſe of many others, and rang'd exactly in the ſame direction with the filaments in the maſs.

It is found in conſiderable plenty in what they call the alabaſter pits in Derbyſhire, which are pits ſunk into thick ſtrata, of a greeniſh or reddiſh Marle, for the Gypſums that lie bury'd in it.

3. *Lachnis albido-griſea, hebes, filamentis craſſioribus, obliquis, abruptis.* *Dull, greyiſh-white Lachnis, with thick, oblique and abrupt filaments.*

This is a very ſingular ſpecies, and ever diſcovers its genus to the naked eye, by the thickneſs and coarſeneſs of its conſtituent filaments; it is of an extreamly compact and firm texture, but conſiderably rough and unequal in its ſtructure; it is found uſually in very large and thick maſſes, of a greyiſh aſh-colour, and of leſs brightneſs than almoſt any other ſpecies; its ſurfaces made by the ends of its filaments, are tolerably ſmooth; its ſides made by their edges, very irregularly ridg'd and rough; and that whether in their natural ſtate, or the edges made by breaking, it uſually emulates a rounded, not corner'd figure, and is various in ſize, from two to fourteen or eighteen inches in diameter, and uſually near as thick as broad. It is compos'd of eight, ten, or twelve orders of filaments, often running ſo directly and evenly thro' it, as to have the appearance of only ſingle ſtreaks; but in other ſpecimens, or frequently enough in other parts of the ſame ſpecimen, a little wav'd, convoluted and inflected, and by that means making angles with one another, and ſhewing their number and orders; they are ever very intimately and cloſely interwoven with one another at their ends, and never ſubject to be ſeparated, as ſome others, by horizontal veins of earth; their complex intertexture at the joining of their ends, is ſo firm, that if the maſſes be made to break tranſverſely, they uſually do it thro' the bodies of ſome of the ranges of fibres, not at their joinings; the filaments cohere ſo firmly alſo ſide-way to one another, that the maſs is more difficultly fiſſile than almoſt any other ſpecies; and the filaments are themſelves ſo harſh and brittle, that it is difficult to ſeparate them in any tolerable length; when parted into ſingle ones, they are very thick and coarſe, extreamly ſhattery both longitudinally and tranſverſly, and not in the ſlighteſt degree either flexile or elaſtic; they are of very rough ſurfaces, appearing as if duſty, extreamly rigid to the touch, of a coarſe and dull whitiſh colour, and very plainly ſtriated longitudinally with more diſtinct ſtriæ than the other ſpecies, but are abſolutely and entirely free from tranſverſe ſtreaks. It is uſual with the filaments of ſuch ſpecies as have theſe tranſverſe ſtriæ, which indeed are much to be ſuſpected for the commiſſures of many ranges of filaments conſtituting them, to break tranſverſly and obliquely at theſe ſtriæ, in endeavouring to ſplit them the other way; and this, if they are ſuch commiſſures, is extreamly natural, ſince in raiſing one range of theſe partial fibres, one naturally diſplaces it from the reſt at its commiſſure, and makes them drop from it; but here the abſolute rigidity, and want of coheſion in the different parts of the filament, has this effect of rendering it ſhattery without theſe commiſſures; for tho' it evidently has none of them, it ever falls to pieces in ſplitting longitudinally, and that not as the croſs ſtriated ones, at certain places, or in any regular direction, but with ragged edges, and perfect irregularity; whatever may be the brittle texture, however, of theſe ſingle filaments, their mutual coheſions in the maſs are ſo firm, that it is one of the ſtrongeſt and hardeſt of all the Fibrariæ.

It is very heavy, and will neither give fire with ſteel, nor ferment with Aqua Fortis, and but very ſlowly and irregularly calcines into a plaiſter, and that but of an obſcure and duſky white.

Examin'd by the Microſcope its filaments appear very rough, coarſe and opake, and of greater diameters than thoſe of any other ſpecies of theſe bodies; they are evidently compos'd of faſciæ of fibres, which are themſelves large and coarſe, and bundled into larger heaps than the fibres of theſe bodies ordinarily are; and tho' the filaments are only an arrangement of ſingle rows of theſe, they yet cannot but be coarſer and larger than ſuch as are made up of ſmaller faſciæ, and thoſe of ſlenderer filaments.

I have obſerv'd great quantities of this in the hills of Yorkſhire, in ſtrata of various kinds, and lying at different depths. The ſpecies mentioned by Dr. Woodward, V. 1. p. 76. ſeems the ſame with this, but I never have ſeen the veins he ſpeaks of in it, nor ever obſerv'd the ſulphureous ſmell, he mentions its yielding when broken, either in this or any other ſuch body: As the ſpecimen the Dr. mentions was from a ſtony quarry; it is not impoſſible, but that it might be ſomewhat alter'd by an admixture of ſtony matter.

4. *Lachnis albiſſima hebes, filamentis rectis, abruptis, latioribus.*
Dull, white Lachnis, with ſtrait, broad and abrupt filaments.

This is a very dull and dead looking ſpecies; it is of a remarkably even and cloſe ſtructure, yet extreamly friable, looſe and ſhattery; it is found in ſhort and thick maſſes, and is ever of a perfectly ſnow white colour; its horizontal ſurfaces are ſcabrous, rough and unequal, and have not the leaſt gloſs on them; and its ſides, where the edges of its filaments come in view, are very ſmooth and even, but conſiderably dull and dead for a body of this kind. It is found in maſſes of no determinate ſhape, but from two to ſix inches in breadth; and in theſe larger pieces, uſually of three or four inches thick: Whatever is its diameter, however, it is ever compos'd only of two rows or orders of filaments; theſe are moderately broad, very exactly and evenly extended thro' the maſs, and meeting and running in among one another near its center; they are never interrupted by horizontal veins of earth, nor ever bent or convoluted; they adhere very ſlightly to one another, and the maſs is therefore ever extreamly friable and ſhattery, ſplitting with the ſlighteſt force; the filaments are not eaſily taken off ſingle, notwithſtanding that they ſeparate ſo eaſily; for they are ſo extreamly brittle, that they always break acroſs in the attempt, and make it difficult to procure a fragment of one of half an inch in length; it is eaſily to be conceiv'd, theſe can be neither flexile nor elaſtic; they are of very remarkably rough, and as it were, duſty ſurfaces, and have the leaſt ſplendor of thoſe of any body of this claſs; they are plainly ſtriated lengthwiſe, but do not ſhew any tranſverſe ſtreaks, and have leſs tranſparence than moſt others; the maſſes are of leſs hardneſs than almoſt any other kind.

It will neither give fire with ſteel, nor ferment with Aqua Fortis; they calcine extreamly quick, and make a very fair and valuable plaiſter.

Examin'd by the Microſcope the filaments are ſeen to be compos'd of ſingle fibres, rang'd very evenly together, but cohering very ſlightly one with another; they are alſo by this means ſeen to be full of very minute and ſlender, oblique, tranſverſe ſtreaks; theſe ſeem the commiſſures of the ends of ſhort fibres, which are ſo evenly adjuſted at them, as to appear to our niceſt view continu'd and ſingle thro' the length of the filament; they eaſily break acroſs at theſe, and the great number of theſe ſeems to make the whole ſo extreamly friable.

It is very common in the Marle pits of Derbyſhire, I have ſeen ſpecimens of it alſo about Mount ſorrel in Leiceſterſhire.

5. *Lachnis lucida, albida, filamentis abruptis, latiſſimis, obliquis, convolutis & inflexis.*
Whitiſh, gloſſy Lachnis, with broad, oblique, convoluted and abrupt filaments.

This is a very beautiful, tho' very irregularly conſtructed ſpecies; it is of rude, rough and extreamly irregular texture, but conſiderably firm and compact, and very gloſſy. It is found in moderately large, flat maſſes, of a whitiſh colour, with ſome faint admixture of grey; its horizontal ſurfaces are very ſmooth, bright and gloſſy; its ſides much more ſo; and very beautifully, tho' irregularly radicated by the confuſed direction of the ſeveral orders of filaments it is compos'd of; it is of no determinate figure, but is found from two to ten inches in breadth, and from half an inch to more than one inch in thickneſs; it is compos'd of two, three, four, or ſometimes more orders of very broad and very glittering filaments, and theſe not at all interrupted by veins of extraneous matter, but confuſedly and variouſly interwoven at their ends among one another; they are all very ſhort and broad, variouſly inflected and wav'd, and thrown together in all directions in the maſs, making angles of all degrees with one another, and giving a very beautiful fimbriated plumoſe, and ſometimes reticulate figure to the central part of the maſſes, where their intertexture is uſually moſt complex; they cohere ſo firmly by means of this, that the maſs is very difficultly and very irregularly fiſſile, and the filaments not eaſily ſeparated, unleſs in thick bundles; they are ſcarce at all flexile or elaſtic, and are of a firm conſtitution, abſolutely colourleſs, and conſiderably bright and pellucid; their longitudinal ſtreaks, after the force neceſſarily us'd in ſeparating them from the maſs, are very viſible, and may be ſeen to run parallelly and diſtinctly thro' their whole length; they have alſo ſome tranſverſe ſtreaks, but theſe are leſs regular, and ſometimes wholly wanting; the maſſes are conſiderably hard, and very heavy.

They will neither give fire with ſteel, nor ferment with Aqua Fortis, but burn very freely to a fine white plaiſter.

Examin'd by the Microſcope, the filaments appear very bright and pellucid, and in their breadth and internal ſtructure ſo much reſemble the flakes of the finer Selenitæ, that they are ſcarce to be diſtinguiſh'd from them; their conſtituent fibres are not collected into faſciæ, but rang'd ſingly and evenly thro' them; and the tranſverſe ſtreaks are narrow, and placed in the ſame oblique direction with thoſe of the ordinary Selenitæ.

It is very common in Yorkſhire, in the pits of ſoft blue clay, and has been found at times in the fiſſures of the ſtrata of ſtone, not unfrequently alſo it is ſeen on the ſhores, and there uſually has a roundiſh form, which the rolling among and againſt harder bodies has given it; and in this ſtate the croſs directions of its filaments give it a very ſingular look.

6. *Lachnis carnea, hebes, filamentis latioribus, brevibus interruptis.* *Dull, fleſh-colour'd Lachnis, with broad, ſhort and interrupted filaments.*

This, tho' of leſs beauty than the former, is, however, a very ſingular and remarkable ſpecies; it is of a coarſe, harſh, rough and irregular ſtructure, and very friable and ſhattery: It is found in very large and very thick maſſes, and is of a ſomewhat dull look, but of a very agreeable pale fleſh-colour; its horizontal ſurfaces are very rude, rugged and irregular, but not without ſome little gloſs, and its ſides are compos'd of various orders of filaments irregularly diſpos'd, and interrupted with veins of earth; and themſelves uſually of much leſs brightneſs than the greater part of the other Fibrariæ; it is perfectly irregular in ſhape, but is uſually thicker in proportion to its breadth than any other ſpecies; it is often found of eight, ten, or twelve inches over, and frequently of ſix or eight inches thick; it is compos'd of broad, ſhort and very obliquely rang'd filaments, and is uſually divided into three or four thin layers or beds by thick horizontal veins of the earth of the ſtratum it is lodg'd in; often theſe viens of earth run to the extremities of the maſs, and are ſeen on its ſurfaces, but more frequently they are loſt before they reach thither, and the edges of the body are made up of ſo many orders of filaments meeting with and interſecting one another: The filaments which compoſe this maſs are not only ſhort and interrupted, but they are uſually bent and crooked, and laid in a ſlanting direction thro' it; they adhere ſo ſlightly either at their ſides, or where not interrupted at their ends, that the maſs is very friable and very fiſſile; its ſeparated filaments are not at all flexile or elaſtic, they readily ſeparate from one another into even ſingle ones, and then appear colourleſs of dull and ſomewhat rough ſurfaces, ſtriated lengthway but not at all acroſs, very brittle and of the ſlighteſt degree of tranſparence of the filaments of almoſt all the Fibrariæ; in the maſs when broken, many of theſe filaments appear indeed conſiderably bright and gloſſy; this is the caſe alſo of ſome other ſpecies of the duller and more opake kinds, but the reaſon of it is, that the ſurfaces of the filaments are not ſeen there, but their inner ſtructure or the ſurfaces of their conſtituent fibres, which are ever of gloſſy ſurfaces when freſh broken, and the filaments of theſe coarſer Talcs are themſelves ſo looſely compacted, that they frequently ſplit inſtead of ſeparating on the breaking of the maſs; it is in the whole ſofter and more friable than almoſt any other kind, and is conſiderably heavy.

It will not give fire with ſteel, nor ferment with Aqua Fortis, but burns very freely into an excellent plaiſter.

Examin'd by the Microſcope, its filaments appear very complex, and compos'd of large faſciæ or bundles of fibres into which they are eaſily ſeparated; theſe are ſomewhat large and coarſe for bodies of this minute kind, and are ſubject to a few tranſverſe ſtreaks which are very ſlender; but it is obſervable, that the faſciæ always break at theſe ſtreaks be they ever ſo ſmall.

It is found in great plenty in the alabaſter-pits, as they are call'd in Derbyſhire, and is very profitably made into a good Gypſum.

SECT. II. LACHNIDES, compos'd of finer and ſmaller filaments.

1. *Lachnis elegantiſſima, carnea, lucida, filamentis anguſtiſſimis, abruptis, intertextis.*

Beautiful, fleſh-colour'd, gloſſy Lachnis, with ſlender, abrupt and interwoven filaments.

THIS is one of the moſt elegant of the Fibrariæ; it is of a very fine, ſmooth and equal texture, and extreamly firm, compact and hard; it is found in very broad flat maſſes, and is of an extreamly elegant and and beautiful fleſh-colour; its horizontal ſurfaces made by the ends of its conſtituent filaments are but moderately ſmooth, but very bright and gloſſy; its ſides where the ſurfaces of the filaments are ſeen, are ſeldom at all foul'd by the earth among which they lie, but very beautifully even, bright and gloſſy; it is of no determinate figure, but uſually of four, five, or ſix inches broad, and ſeldom of more than one inch in thickneſs; it is compos'd of innumerable ſmall and very evenly rang'd filaments, not reaching each thro' the ſubſtance of the maſs, but all ſhort, abrupt and variouſly diſpos'd and interwoven with one another, three, four, or five ranges of them often going to make up leſs than an inch in thickneſs; they are, however, very cloſely and firmly interwoven among one another, and never leave the leaſt ſpaces, or are interrupted, as ſome before deſcribed frequently are, by veins of earth; their cloſe coheſion and entangled texture, make the maſs they form the moſt difficultly fiſſile of all the Fibrariæ; it ſplits ſomewhat unevenly when forc'd to it, and its filaments are not eaſily ſeparated unleſs in ſmall lengths, and in large bundles together; they are, when parted as nicely as may be, not at all flexile or elaſtic, of extreamly ſmooth, bright and gloſſy ſurfaces, very plainly ſtriated longitudinally, and ſometimes have a few marks of faint tranſverſe ſtreaks; they are very beautifully tranſparent; and the maſs they form is very hard and heavy.

They will neither give fire with ſteel, nor ferment with Aqua Fortis, but calcine very freely into a fine white and very valuable plaiſter.

Examin'd by the Microſcope, the filaments appear very beautifully tranſparent, and compos'd of almoſt innumerable ſlender capillaments, not bundled into faſciæ, but evenly diſtributed thro' the whole body of the maſs; it is not neceſſary to bend or cruſh theſe in order to the examining them, their fibres are always ſufficiently diſturbed in the ſeparating them from the maſs.

It is found in great abundance on Mendip-Hills, in Somerſetſhire, in ſtrata of a ſoft Clay; as alſo among the rocks above Mount Sorrel in Leiceſterſhire. I have alſo ſeen many maſſes of it, both in perpendicular and horizontal fiſſures; it burns ſo freely, and makes ſo excellent a plaiſter, that it would certainly be worth ſeeking after on Mendip-Hills, where, from what I have ſeen of it, I make no doubt but it might be dug in very conſiderable quantities; in the other place there ſeems no great plenty of it.

2. *Lachnis albido-ſubcærulea, filamentis anguſtiſſimis, rectis, abruptis.*
Blueiſh-white Lachnis, with very narrow, ſtrait and abrupt filaments.

This is a very evenly conſtructed and very beautiful ſpecies; it is of a moderately fine and ſmooth texture, and conſiderably firm and compact; it is always found in very broad flat maſſes, and is of a dull white, with a faint admixture of a dead blueiſh grey: its horizontal ſurfaces are remarkably even, ſmooth and gloſſy, and its ſides ſlightly ridg'd with the ſtrait parallel edges of the various orders of the filaments; it is of no determinate ſhape, and is often found of ten, twelve and fourteen inches broad, yet very ſeldom of more than an inch in thickneſs. It is compos'd of three, four, or ſometimes more orders of filaments, all very ſtrait, and laid evenly and perpendicularly over one another, and tho' abrupt and truly ſeparate bodies, yet running in among one another, and leaving no room for the interruptions of veins of earth; the filaments are ever ſtrait, never convoluted or inflected, nor ever rang'd obliquely in the maſs; they cohere ſo ſlightly together, that the maſs is very fiſſile, ſplitting perpendicularly with great eaſe, tho' it is not without difficulty that it can be made to break a-croſs the fibres, and then ſeldom regularly at the joinings of the ſeveral orders, their commiſſures there being ſo firm as uſually to prove the ſtronger parts of the maſs; the ſeparated filaments ſplit again pretty eaſily into a ſmaller ſort, which are truly no other than the faſciæ or bundles of their conſtituent fibres; theſe are not at all flexile, breaking a-croſs on the leaſt force, exerted toward the bending of them. They are of moderately ſmooth and ſomewhat gloſſy ſurfaces, tho' leſs ſo than many others, and are in many places ſtriated a-croſs with very plain and not very diſtant tranſverſe ſtreaks, they have leſs of the tranſparence ſo natural to the Fibrariæ than moſt other ſpecies.

The maſſes are moderately heavy, and will not give fire with ſteel, nor ferment with Aqua Fortis, but very freely calcine into a perfectly white and very valuable plaiſter.

Examin'd by the Microſcope, the filaments appear compos'd of the largeſt and coarſeſt faſciæ of thoſe of almoſt any ſpecies; the fibres that compoſe them being alſo very thick and broad for bodies of that minute order.

It is found in the Marle pits of Staffordſhire and ſome other counties, and that in conſiderable plenty; tho' it has not yet, that I have heard of, ever been regarded as a thing of any uſe or value to the owners of the pits.

3. *Lachnis lucida, griſeo-vireſcens, filamentis latioribus, tenuiſſimis, abruptis.*
Gloſſy, greeniſh-grey Lachnis, with broad, very thin, abrupt filaments.

This is an extreamly ſingular ſpecies, and in nothing more remarkable than in the vaſt breadth its maſſes are ſometimes found of: no other ever extending itſelf to ſuch a ſize; it is of a very firm, compact and cloſe, tho' mighty irregular and unequal texture; and is ever found in thin tho' very broad maſſes, and of a greeniſh-grey, a very pleaſing colour with a great deal of brightneſs. Its horizontal ſurfaces are variouſly undulated, and full of ridges and cavities, yet very conſiderably bright and gloſſy; its ſides, where the edges or flat ſurfaces of its filaments come in view, are very ſmooth and even, not ridg'd as thoſe of many others are, and very gloſſy and ſoft to the touch. It is of no determinate ſhape, more than that it is ever thin and flat, its maſſes are ſeldom more than three or four inches in thickneſs, tho' frequently four or five feet in breadth. They are compos'd uſually of no more than two ranges or orders of filaments, which meet at, or near the center of the maſs, and are very variouſly and prettily interwoven with one another there, making, as in many other ſpecies, that the ſtrongeſt part of the ſtone, and the laſt place that it is likely to ſeparate at in breaking tranſverſely; the filaments are never diſpos'd in ſtrait lines, or run directly perpendicularly thro' the ſtone, but are ever bent and convoluted, and often beſide this plac'd very obliquely, and make acute angles with one another;

they cohere ſo well at their ſides that the maſs is not eaſily fiſſile, nor will ever be made to ſplit with any great regularity; nor can the filaments be eaſily taken off, otherwiſe than in cruſhing the maſs; from theſe, however, they may with care be ſeparated afterwards, and are there found to be not at all flexile or elaſtic, of very ſmooth, bright and gloſſy ſurfaces, conſiderably broad, and extreamly thin, and more tranſparent than thoſe of moſt others; in this reſpect indeed not inferior to the pureſt of the foliaceous Talcs, and after a little bruiſing are viſibly mark'd with a great number of ſlender, ſtrait, longitudinal lines, interſected by a few oblique and tranſverſe ones.

The maſs is very heavy and conſiderably firm and hard, but will neither give fire with ſteel, nor ferment with Aqua Fortis, and calcines but ſlowly, but to a very fair white and valuable plaiſter.

Examin'd by the Microſcope its filaments appear extreamly pellucid, bright and beautiful, they are very regularly ſtriated, longitudinally and tranſverſely as the flakes of the Selenitæ; and are indeed no way to be diſtinguiſh'd from them, the longitudinal ſtriæ are the marks of the fine and ſlender fibres, of which theſe filaments are compos'd, which are in this ſpecies not bundled into faſciæ, but laid evenly and ſingly in rows, each row conſtituting one filament of the maſs; and hence it is that the filaments are in this ſpecies ſo extreamly thin and pellucid.

I have obſerv'd it at various depths, in many parts of Yorkſhire; it is alſo found not unfrequently on the ſhores, and ſometimes hanging in ridges out of the cliffs.

4. *Lachnis lucida, albido ſubvirens, filamentis anguſtis, abruptis & inflexis. Gloſſy, greeniſh-white Lachnis, with narrow, abrupt and inflected filaments.*

This is a very ſingular and extraordinary ſpecies, and of all others has the moſt remarkably inflected filaments: It is of a very cloſe, firm and compact, tho' of this extreamly uneven and ſingular texture. It is found in maſſes not ſo broad and flat as the ordinary kinds, but frequently very thick, its colour is a bright white, with a ſlight but equally diffus'd tinge of a duſky blueiſh or greyiſh green; its horizontal ſurfaces are extreamly rough, rude and uneven, but not without ſome gloſs; its ſides form'd by the edges of its filaments, very variouſly lucid and ſhining, as held in different directions to the light, but ever very ſmooth and even, tho' compos'd of ſuch irregularly rang'd filaments. It is of no determinate ſhape, but often emulates our ordinary rude nodules of flint in the chalk pits, and is frequently as thick as broad; its ſize is various, ſometimes maſſes of leſs than an inch in diameter are found, at others, thoſe of ten or twelve inches: It is compos'd of many rows of abrupt and interrupted filaments, and uſually in the thicker maſſes has veins of earth, the ſame with that of the ſtratum it lies in, running horizontally thro' it, at about an inch diſtance, and dividing the whole into ſo many tables, as the thickneſs of the maſs will allow of; theſe earthly veins ſeldom or never paſs the whole ſubſtance of the maſs however, and at the ends where they are wanting, the complex ſtructure of the whole ſurface made ſometimes of ten or twelve orders, or ranges of filaments, variouſly convoluted and interſecting one another, is an extreamly pleaſing ſight; in the reſt of the maſs, each plate or table is uſually made up of only two orders or rows of crooked filaments, meeting and interwoven in various directions, at or near the center of the maſs. They adhere ſo firmly together in their parallel ſurfaces, and ſo much more ſo by means of this intertexture, that the maſs is but very difficultly and very irregularly fiſſile: its filaments are not eaſily to be ſeparated, otherwiſe than in congeries; and are not at all flexile nor elaſtic: They are of very ſmooth and equal ſurfaces, perfectly colourleſs when view'd ſingly, full of longitudinal ſtriæ, always made viſible by the force us'd in ſeparating them from the maſs, and never ſubject to the leaſt appearance of tranſverſe lines. They are very narrow and roundiſh, and are more bright and tranſparent than thoſe of moſt other kinds.

The maſſes are very hard and heavy, but will neither give fire with ſteel, nor ferment with Aqua Fortis; and calcine more ſlowly than almoſt any other kind.

Examin'd by the Microſcope its filaments appear of a rounder figure than thoſe of any other ſpecies, they are evidently compos'd of ſingle not faſciated fibres, and thoſe extreamly minute and ſlender.

It is found in the marle pits of Derbyſhire, and is one of the ſpecies uſually employ'd in burning to plaiſter.

SERIES II.

CLASS II. ORDER II. GENUS I.

ASBESTI.

FIBROSE bodies flexile and elaſtic, compos'd of ſingle and continuous filaments.

SECT. I. ASBESTI whoſe filaments are naturally collected into compact maſſes.

1. *Aſbeſtus mollior, ſubvireſcens, filamentis tenuioribus, continuis, inflexis.* *Soft, greeniſh Aſbeſtos, with ſlender, inflected, continued filaments.*

This is a very beautiful ſpecies but uſually ſhort; it is of an extreamly ſmooth, even, and regular ſtructure, conſiderably firm and compact, and is extreamly ſoft and ſilky to the touch; it never is naturally found in detach'd looſe maſſes, but always in form of veins in a peculiar marble, a coarſe ſort of the Ophites nigra antiquorum, hereafter to be deſcrib'd; the veins it makes in this are uſually very narrow, from one tenth to a quarter of an inch, being their more uſual diameters; it is very rare to meet with any coming up to half an inch, and beyond that ſcarce any are met with. It is of various degrees of colour, between green, black and white, it has all of it more or leſs of each of theſe, but according to the exceſs of the one or the other of them, is either blackiſh or greeniſh, or nearly white: It is of an extreamly bright and gloſſy ſurface, and is compos'd of a multitude of ſlender filaments, laid very evenly and regularly together, and all running without interruption perpendicularly a-croſs the maſs or vein: theſe are ſometimes very nearly ſtrait, but they are uſually a little inflected, eſpecially toward their centers; and when taken off are found naturally bow'd in the middle of their lengths; the matter of this Aſbeſtos is eaſily pick'd out of the marble in ſmall maſſes, and theſe are very regularly fiſſile, tho' not ſo eaſily as ſome of the laxer kinds; the ſeparated filaments are a little elaſtic, and very flexile and eaſily bent into any direction; they don't very readily break a-croſs, but on rubbing between the fingers, are eaſily ſeparated into ſmaller, and ſhorter filaments, and thoſe afterwards into fibres of ſuch extream fineneſs as to make a downy and very ſoft ſubſtance. We evidently ſee by this ſimple examination, that the filaments of this ſpecies are compos'd of other ſhorter ſecondary filaments, and thoſe of extreamly minute fibres of their own length; they are of a very remarkably gloſſy ſurface, but ſeem not to have much tranſparence; the maſſes are conſiderably heavy, and moderately compact and hard.

It will neither give fire with ſteel nor ferment with Aqua Fortis, but in a ſtrong fire ſuffers ſome change, tho' not a very great one; the filaments only become much more ridg'd, and ſeparate more eaſily from one another than before, and loſe their brightneſs.

Examin'd by the Microſcope, a ſingle filament ſeparated carefully, and without injuring it, from the maſs, appears one ſimple, regular, round and opake body, but a little ruffled or diſturb'd, either by bending, cruſhing or otherwiſe: It is eaſily ſeen to be compos'd of a great number of ſhorter filaments naturally of a laxer texture, and compos'd each of an innumerable multitude of ſlender Spiculæ, all of the ſame determinate length and thickneſs, their length being the ſame with that of the ſecondary filaments compos'd of them, and all being pointed like fine needles at each end. They appear alſo in ſome lights to be hollow and each a regular tube; if ſo it is a very ſingular ſtructure, but certainty is ſo difficultly attained in objects of this extream ſmallneſs, that there is no poſitively affirming it; this however is certain, and may ſerve as part of the character of the body, that theſe are to all examination its ultimate fibres, and that it is compos'd of no more than two orders of threads, the firſt of theſe ultimate fibres into the ſhorter, or as they are here called ſecondary filaments, the ſecond of thoſe into the viſible filaments that conſtitute the maſs.

It is found in the iſland of Angleſea, and in ſome parts of Wales, lodg'd horizontally in vaſt ſtrata of this marble. I obſerv'd before, that it is never naturally found looſe or in ſeparate maſſes, but accidentally it may be ſo, as it is ſometimes on the Angleſea ſhores, in ſmall lumps, uſually as large as a filberd, ſeldom larger, which have been evidently enough waſh'd out of the ſtrata of marble.

2. *Aſbeſtus ſericeus, albido-fuſcus, filamentis longioribus, continuis latis: Whitiſh-brown, ſilky Aſbeſtos, with long, continu'd, and flat filaments.*

This is a very elegant ſpecies, and is well known in America, under the name of petrify'd wood; it is of an extreamly even, regular, and cloſe texture, and very firm and compact, extreamly ſoft and ſilky to the touch, and of an agreeable whitiſh brown in colour, tho' not without ſomething of a yellowiſh caſt with the brown; it is not found as the before deſcribed ſpecies, in form of veins in other ſtones, but is ever looſe and ſeparate; and indeed, from the parallel ſtructure, and orderly diſpoſition of its fibres in the manner of the grain of wood, may very naturally be miſtaken for wood petrify'd: It is uſually found in long maſſes, with the filaments continu'd, and running horizontally its whole length; and its ends, which are made of the extremities of theſe filaments, are uſually uneven and abrupt, and have not leſs of the appearance of the broken end, or tranſverſe grain of a piece of ſtick, than the horizontal and lateral ſurfaces have of its longitudinal or direct grain; its maſſes are never perfectly round, but uſually flatted, and ſomewhat angular; they are various in ſize, their uſual ſtandard is from one inch to three inches in length, and about three fourths of an inch in diameter; but I have ſeen of them of five inches long, and two in breadth; it is compos'd even in the longeſt of theſe maſſes, of very ſtrait, even, and always of continu'd filaments, each running the whole length of the maſs; they are ſometimes a little inflected, but this is ſeldom the caſe; and when it is, ſeems to have been owing to accident, and is ever but in a very ſlight degree; it is regularly, but not eaſily fiſſile. Its filaments are not eaſily ſeparated ſingly to any length, without breaking, but in ſmall cluſters, may, by a careful hand, be rais'd all along, and taken off without breaking of the whole length of the maſs; theſe cluſters may again be carefully ſeparated, and a ſingle filament at length preſerv'd of the whole length; theſe filaments are conſiderably large, and always broad and flat; they are tolerably flexile, but ſcarce at all elaſtic, and eaſily ſeparate, on rubbing between the fingers, into a multitude of ſmaller round filaments, and thoſe into a ſoft ſilky down: The filaments which compoſe the maſs are laid together with the moſt perfect regularity, and cohere very firmly one with another; they are of very ſmooth and gloſſy ſurfaces, but not at all tranſparent; and the maſſes themſelves are very hard and heavy.

They will neither give fire with ſteel, nor ferment with Aqua Fortis, and ſuffer but very little change even in the longeſt continuance in an open fire; all the changes found in them on taking out are, that they have loſt their brownneſs, and are ſomewhat more rigid, and of leſs gloſſy ſurfaces.

Examin'd by the Microſcope, the filaments appear of a compact, cloſe ſtructure, and very ſmooth and opake; they very eaſily ſeparate, however, into the ſhorter ſecondary filaments, already deſcrib'd, which are of a roundiſh figure; and theſe may with the point of a fine needle be again broken into very ſlender and pointed fibres, but even theſe are not the ultimate fibres in this ſpecies, but may be again ſeparated into millions of others of inconceivable fineneſs; it differs from the greater number of the kinds in this fourth diviſion, which is very eaſy in it, and even in this, the fibres, tho' ſo extreamly minute, are very little tranſparent.

It is found in great abundance in many parts of America: in Virginia and Penſilvania they ſcarce ever dig to a few feet in depth, without meeting with more or leſs of it; but its greateſt abundance is on the Parqualian Mountains, in the New Jerſeys, where it lies on the ſurface of the earth.

3. *Aſbeſtus ſericeus, cinereus, filamentis longiſſimis, craſſiuſculis, continuis ſubrotundis.*

Grey, ſilky Aſbeſtos, with very long, thick, continu'd and roundiſh filaments.

This is a very ſingular ſpecies, little known to the world, and the product, as far as is hitherto known, of our own territories only, yet poſſibly the beſt and moſt valuable ſpecies of all the claſs. It is of a ſomewhat coarſe ſtructure, but of an extreamly even, regular, and very compact texture, conſiderably ſoft and ſilky to the touch, of a pale aſh-colour or grey, and not very bright or gloſſy; it is found as the former ſpecies, not conſtituting veins in marble, but in ſeparate, diſtinct, and looſe maſſes; theſe are ever long, and uſually flat, very often perfectly ſtrait, but ſometimes a little inflected, and not unaptly reſembling a rib; they are of various length, from two or three inches, to nine, ten or more, and uſually in the larger pieces are of about two inches in breadth, and one or a little more than that in thickneſs; they are abrupt and uneven at their ends, and by the diſtribution of their filaments repreſent the grain of wood ſo exactly, as to be uſually miſtaken for wood petrify'd. They are compos'd of large and roundiſh filaments, laid with great evenneſs and regularity ſide by ſide, and ſometimes running in ſtrait lines the whole length of the maſs, but more frequently they are a little inflected; they always are continu'd, however, without interruption, the whole length of the maſs, and may be trac'd ſingly to its utmoſt extent; it is harder in the maſs than any other ſpecies in this Genus, and therefore not ſo freely or eaſily fiſſile, tho' ever ſplitting with great evenneſs and regularity ſo far as it is ſeparated; its filaments can ſeldom be ſeparated ſingly to more than an inch and half in length, being naturally brittle, and very firmly united in the maſs; they are leſs flexile than many others, and more elaſtic, and are not ſo eaſily moulder'd into down between the fingers; the firſt eſſay toward it is, by their dividing into a number of ſlender, pointed, and angular filaments, and theſe with ſome difficulty may be afterwards work'd into down, but that uſually very ſhort and complex, as the fibres are continually breaking acroſs in the attempt; the ſeparated filaments are of a ſomewhat rough, and, as it were, duſty ſurface, and of but little brightneſs, and ſcarce the leaſt tranſparence; the whole maſſes are the hardeſt and heavieſt of all the Aſbeſti.

It will neither give fire with ſteel, nor ferment with Aqua Fortis; and ſuffers not the leaſt change in the moſt intenſe fire, the very colour not being at all affected or alter'd by it.

Examin'd by the Microſcope, it appears perfectly even and regular in the diſpoſition of the filaments, and they really continu'd without breach or interruption to the greateſt lengths of the maſſes; they are of an irregular roundiſh figure, ſometimes more or leſs flatted, but never at all angular or corner'd; they break longitudinally into very ſhort faciæ of fibres, which are all laid as regularly and evenly themſelves in the compoſition of the filaments, as they in the maſs; the fibres that theſe are compos'd of, however, may be ſubdivided into extreamly minute, ſhort and ſlender capillary ſubſtances, pointed at both ends, and laid together in all ſorts of directions; the ultimate fibres have in this ſpecies ſome ſhare of tranſparence, the others not the leaſt appearance of it.

It is found in the Highlands of Scotland, in many places on the ſurface of the earth, covering regular ſpots of ten or twenty yards ſquare, and not ſcatter'd at random all about; Mr. Wilſon gives an account of this ſpecies to the Royal Society, and mentions its being found in the ground of one of the Gordons in Achindore, in Aberdeenſhire, in the neighbourhood of the Highlands; that very place is ſtill found to abound with it, in the ſpot mention'd by this gentleman; he did not, however, diſtinguiſh between this ſpecies and the white naturally looſe Linum Aſbeſtinum, found in the ſame place, and to be deſcrib'd hereafter, tho' a perfectly diſtinct, and very different ſubſtance.

4. *Aſbeſtus ſericeus, cinereo-virens, filamentis longioribus, tenuiſſimis, continuis.*

Greyiſh-green, ſilky Aſbeſtos, with long, continu'd, and very ſlender filaments.

This is the Aſbeſtos ſo common in the iſland of Cyprus, and is a very valuable, as well as a very beautiful kind: It is of an extreamly fine and even texture, but not very firm or compact, extreamly ſoft and ſilky to the touch, and of a duſky greyiſh colour, with a faint admixture of an obſcure green; it is found looſe and in ſeparate maſſes, which are always of an irregularly oblong figure, very evenly ſtriated, and like the reſt, much reſembling the grain of wood, and are abrupt, and irregularly, and unevenly terminated at their ends; they are found very frequently in ſmall nodules, not exceeding the weight of a quarter of an ounce, but are at times met with up to three inches in length, and of about half an inch in diameter; ſometimes irregularly rounded, but more uſually flattiſh, and always perfectly ſtrait. They are compos'd of continu'd, very regularly diſpos'd, and very ſlender filaments, of a bright gloſſy complexion, and of a roundiſh figure; theſe are all perfectly ſtrait, of equal thickneſs throughout the whole maſs, and very cloſely and evenly join'd at their edges; the maſſes are of a lax texture, notwithſtanding this extream regularity of their ſtructure, and are very eaſily and evenly fiſſile; the ſingle filaments are with a little care, perfectly ſeparable from the maſs, and may be preſerv'd in their true ſize and figure; they are, when thus ſeparated, very flexile, but ſcarce at all elaſtic, and eaſily moulder away on rubbing between the fingers, into a very fine and ſoft, but a very ſhort down; they are of extreamly bright and gloſſy ſurfaces, and evidently full of longitudinal ſtriæ, which are indeed no other than the commiſſures of the ranges of ſhorter filaments which compoſe them; they are, when ſeparated into theſe, the moſt tranſparent of almoſt any of the filaments of theſe bodies, if carefully examin'd againſt a good light. The maſſes are conſiderably heavy, but not at all hard or compact.

It will neither give fire with ſteel, nor ferment with Aqua Fortis, nor ſuffer the leaſt viſible change, unleſs that of the loſing its caſt of green in the fire.

Examin'd by the Microſcope, the ſeparated filaments appear very evidently compos'd each of many ſeries or orders of ſhorter and ſmaller filaments; and theſe very readily ſeperate and become diſtinctly viſible on the ſlighteſt bending of one of the complex filaments; the point of a fine needle will open theſe again into a vaſt multitude of regularly ſhap'd, but yet ſlenderer, ſmaller bodies, which ſeem the ultimate fibres of the maſs, ſince they are all regularly of a ſhape, and never can be divided farther by any art; theſe are laid as regularly and evenly in the filaments they conſtitute, as they in the larger, or thoſe in the general maſs; whence the eaſy and regular ſplitting of the whole into ever ſo minute threads; theſe ultimate fibres before the Microſcope, are perfectly tranſparent as cryſtal.

It is found on the ſurface of the earth, and waſh'd about on the ſhores of the iſland of Cyprus in many places in great abundance, and has been alſo found in ſome parts of Italy.

SECT. II. ASBESTI, whoſe filaments are naturally diſunited, and never form'd into compact maſſes.

THERE are frequent inſtances of the ſeveral kinds of Aſbeſtus before deſcrib'd; being found accidentally, broken and diſunited; but the threads of theſe will be always eaſily refer'd to their proper ſpecies; there is, however, one ſpecies of true Linum Aſbeſtinum, which is different from the diſunited threads of all the others, and never is found otherwiſe than looſe, and in form of diſhevell'd ſkains of ſilk or thread.

1. *Aſbeſtus albeſcens, filamentoſus, fibris latiuſculis.*
White, looſe, thready Aſbeſtos, with broad filaments.

This is a very ſingular and beautiful Foſſil, it is not found in veins in marble as many of the other Aſbeſti are, nor in compact and ſeparate maſſes of itſelf in the earth as the reſt; but ever in a looſe diſhevell'd form, and very much reſembling the artificially ſeparated filaments of ſome unknown ſpecies of that body; it is uſually found in conſiderable bundles, and is compos'd of long and generally crooked filaments of a flatted figure, and of a pure ſnow white; they are conſiderably broader than the filaments of any known ſpecies of the Aſbeſtos, and are found from two inches, to eight, ten, twelve, or more in length: they are often found perfectly looſe, and in a manner ſingle, but are frequently alſo looſely bundled together as the threads of cotton in the wicks of lamps, tho' never contorted or twiſted round one another, nor ever at all cohering together either at their ſides or ends; there is no trouble in procuring the ſeparate filaments of this ſpecies, which are ever of one equal and continued ſtructure, of a ſmooth but not gloſſy ſurface, manifeſtly ſtriated longitudinally, and in many places with irregular and interrupted tranſverſe ſtreaks, and are never any other way interrupted in their lengths: the longitudinal ſtriæ are the commiſſures of the edges of the ſhorter and ſlender filaments, which compoſe theſe; and the tranſverſe ones, the joinings of the ends of the various ſeries of them; theſe filaments are extreamly flexile, but ſcarce at all elaſtic; the point of a fine needle eaſily divides them into multitudes of ſhort and ſmall filaments, which are found all rang'd perfectly ſtraitly and evenly in the larger, and are all of ſmooth and determinate ſurfaces, all of a ſize both in length and thickneſs, and all manifeſtly regularly form'd bodies; they are not round but flatted as the more complex filaments, and much reſemble them in all things except their tranſverſe ſtriæ; a little force either by rubbing, bending, or otherwiſe, again divides theſe into a third ſort of bodies as regularly form'd as the reſt; theſe are indeed of various lengths, but they are all flat, and all rang'd in the ſame beautiful order, and are by no force to be divided farther: they are the largeſt of all the ultimate fibres of the Aſbeſti, but are evidently ſuch. This ſeems the lighteſt of all the ſpecies of the Aſbeſtus.

It will not give fire with ſteel, nor ferment with Aqua Fortis, and ſuffers not the leaſt change in the fire.

Examin'd by the Microſcope, its filaments appear extreamly different from thoſe of all the other ſpecies, they are broad and flat, like ſo many ribbands, and of the moſt deeply ſtriated texture of all others; the help of good glaſſes ſhews us alſo in this ſpecies as many tranſverſe ſtreaks as there are ranges of ſhort filaments in the whole: theſe are very irregular notch'd and undulated, but ſeem pretty firm commiſſures; and doubtleſs theſe are in being in every other ſpecies, tho' this is the only one where we can diſcover them; what ſeem to the naked eye the ultimate fibres of this body, are truly and certainly ſo, ſince the Microſcope can no more diſcover any ſmaller fibres, ſtreaks, or commiſſures in them than the naked eye, not even after burning; nor after that trial can they any more than before be ſplit or farther divided, otherwiſe than by reducing them to an abſolutely ſhapeleſs powder.

This is found in the ſame place with the third ſpecies before deſcrib'd, and in many other parts of Scotland, at very inconſiderable depths below the ſurface, and frequently lying on it; it ſeems to promiſe to be the eaſieſt wrought of all the known kinds.

The antients were well acquainted with many kinds of the Aſbeſtus; and the art of ſpinning and making it into cloth tho' one of thoſe very early loſt, yet was evidently once well known among them, and I am very certain might be reviv'd with the Scotch Aſbeſtus here deſcrib'd to this day. One great reaſon of the arts being loſt among the antients, appears to me to have been their meeting with different kinds of the ſtone, and if in one age they had been us'd to a long threaded one, and in a ſucceeding age knew no other than one of our ſhort threaded and abrupt kinds, made up even in a ſmall diameter of many ſeries of filaments, it is no wonder that they could not work it into cloth as their predeceſſors had done, and naturally enough, not diſtinguiſhing the kinds, but thinking all Aſbeſtos alike, blamed their own want of invention or ſkill in workmanſhip to bring it to uſe; and this, I imagine, tho' not hitherto attended to, to have been the very reaſon of the loſs of the art, and can eaſily conceive all the accounts we have of it in the oldeſt authors to be true.

In the days of Pliny, no good ſpecies ſeems to have been known; he mentions it indeed as a certainty, that cloths made of it were then in his time in uſe, which he ſays he had ſeen thrown into the fire, and cleaned better by that means than by waſhing; and tells us, that the ſhrouds of kings were made of it, and by that means their aſhes were preſerv'd pure and entire, without mixing with the aſhes of the funeral pile; *Ardentes ex eo in focis conviviorum vidimus Mappas, ſordibus exuſtis ſplendeſcentes igni magis quam poſſent aquis. Regum inde funebres tunicæ, corporis favillas ab reliquo ſeparant cinere.* One cannot doubt from this, that ſuch cloths were in being in this author's time; but from his account afterwards, the art ſeems then to have been abſolutely loſt, and that for the plain reaſon I have before aſſign'd, that the proper ſpecies were unknown; there ſeems to have been ſcarce any of it found at that time, and what there was, ſeems from all accounts to have been ſome ſmall looſe maſſes of the *Amianthus mollior rubro nigreſcens filamentis abruptis craſſioribus*, hereafter to be deſcrib'd, which is certainly one of the moſt improper of all kinds for working; if this therefore was their ſpecies, it is no wonder that their authors call it *Textu difficillimum.*

Dioſcorides, who wrote ſomewhat before the time of Pliny, deſcribes very accurately the *Aſbuſtus ſericeus, cinereo-virens, filamentis longioribus, tenuiſſimis, continuis*, before deſcrib'd, a ſpecies extreamly proper for this ſort of work; and accordingly ſpeaks of it as a thing well known that incombuſtible cloths were made of it, and ſays nothing of it as an art loſt at that time: he ſays, the ſtone was produc'd in Cyprus (as that kind ſtill is in great plenty) and that in its texture and external appearance, it very much reſembled the *Alumen plumoſum*; that it was of a flexible texture, and that by a proper kind of working a kind of cloths were made of it reſembling thoſe of linnen, and affording a very pleaſing appearance; for that when thrown into the fire they became ignited, but remain'd uninjur'd by it, and came out the cleaner. Pliny afterwards mentions this ſpecies in the words of Dioſcorides, *Alumini ſimilis nihil igni deperdit*; but without any farther notice, ſince, as I apprehend, it was then no longer known.

Paul Venetus mentions it in his Itinerary, under the name of the Salamander-ſtone, from its being unhurt in the fire; he ſays, that it is dug in Aſia, and ſomewhat reſembled wooll, and when cleans'd and dry'd are wrought into an incombuſtible cloth.

Signior Ciampini of Rome, in an account given to the Royal Society of London, and printed in the philoſophical tranſactions, N° 273. p. 911. gives an account of three or four kinds in his poſſeſſion; the firſt probably the ſame with our American kind, but accidentally ting'd a little reddiſh, and the third properly a ſtone of another Genus; he was at the trouble of keeping ſome in a glaſs-houſe fire three weeks, and took it out unaltered, and was ſucceſsful enough to make cloth of ſome of the kinds, by ſteeping the ſtone in water, opening and dividing it with his hands, and ſeparating it from its earthy part, then drying it in a ſieve, then gently carding it as wool, and with the help of oiling the fingers, ſpinning it from off the cards with much care into a coarſe thread, with the help of other thread to hold it together in the working; this thread, he ſays, may with care be work'd into a coarſe cloth; which being thrown into the fire, the thread and oil will burn away, and leave the compoſition entirely of Aſbeſtos: he obſerves however afterwards, that flax mix'd inſtead of thread with the filaments of the Aſbeſtos, and thoſe us'd without carding, made the proceſs ſucceed better, and that the Aſbeſtine paper may be made of the ſhort pieces that remain in the water where the ſtone was waſh'd; and adds, that all things made of it ought to be kept well oil'd, to preſerve them from breaking or waſting from their natural extream dryneſs.

We may be aſſur'd from this and ſome other ſuch accounts, that the Aſbeſtine cloth may be made to this day; and I am very ſenſible, that the thready Aſbeſtos of Scotland will be found to ſucceed on trial without any great difficulty. Mr. Wilſon found the means to make a ſort of yarn of it, and I make no doubt of its ſucceeding in future experiments, to the wiſhes of any one who will try it upon the ſpot, or with a ſufficient quantity of properly choſen filaments, from the place Mr. Wilſon has mention'd for its production, where it is very plentifully to be found at this time.

SERIES II.

Class II. Order II. Genus II.

AMIANTHI.

FIBROSE bodies flexile and elaſtic, compos'd of ſhort and abrupt filaments.

Sect. I. AMIANTHI, compos'd of larger filaments.

1. *Amianthus mollior, rubro nigreſcens, filamentis abruptis, craſſioribus.*

Soft, reddiſh black Aſbeſtos, with thick, abrupt filaments.

This is a ſpecies of a deader colour, and of leſs gloſs than many of the others, it is of a very even, regular and compact texture, and very ſmooth and ſoft to the touch; it never forms regular, looſe, or detach'd nodules, or is found ſeparate, but always in form of veins in various ſtrata of ferrugineous ores, to which it ſeems evidently to owe its colour, which is that of many other of the ferrugineous bodies, a blackiſh ruſt colour, with ſome admixture of a purpliſh red; it is of various thickneſſes in different parts of the ſame ſtratum, and often forms veins of an inch in diameter, tho' many others are but of a third or a fourth of that breadth; it is ever compos'd even in the thickeſt of the veins of only two orders or ranges of filaments, and theſe uſually meet not in the center, but near the upper ſurface of the ſtratum; ſo that the threads of the under range are not unfrequently of three quarters of an inch or more in length, and ſeem as if they might without much difficulty be wrought at leaſt into paper if not into cloth; the ranges of filaments are very beautifully interwoven at their meeting, and make that the ſtrongeſt and firmeſt part of the maſs; they are alſo ever lodg'd in ſtrait perpendicular directions, and have much the appearance of ſingle threads running thro' the whole thickneſs of the maſs till nearly view'd; the top and bottom eaſily ſeparate from the matter they are lodg'd in, and the pieces of Aſbeſtus thus ſeparated, are extreamly eaſily and very regularly and evenly fiſſile; they generally part with great facility into ſlender and even ſingle filaments, and theſe eaſily come off of the whole length of the diameter of the maſs, and neither fall to pieces at the commiſſure, nor elſewhere; they are very flexile, and ſomewhat tho' but little elaſtic, they feel very ſoft and ſilky between the fingers, and are eaſily rubb'd into a woolly ſubſtance compos'd of ſhorter and broken fibres; they are of very ſmooth and equal ſurfaces, but leſs bright and gloſſy than thoſe of many other kinds, and do not ſo eaſily break tranſverſely as many others do; the maſſes are remarkably heavy.

They will neither give fire with ſteel, nor ferment with Aqua Fortis.

It bears the moſt extream force of fire without any injury to its texture, and only comes out a little more rigid, and of a very pale red.

Examin'd by the Microſcope, the filaments are found to be compos'd of ſmaller bundles, or faſciæ of fibres, very regular in figure, and determinate in ſize, and all extreamly ſlender, and perfectly round; theſe filaments are thicker than thoſe of moſt of the other kinds, and the faſciæ they are compos'd of are alſo thick, each containing a vaſt number of the other fibres.

It is very common throughout Germany, and is found in no other places but iron mines, and there uſually at conſiderable depths: its colour, no doubt, it wholly owes to the matter of the ſtrata it is lodg'd in, but its ſtructure ſhews it to be without that a diſtinct ſpecies from all the hitherto known Aſbeſti.

2. *Aſbeſtus mollior, albiſſimus, filamentis brevibus, convolutis, abruptis & intertextis.*

Soft, white, Aſbeſtos, with ſhort, convoluted, abrupt and interwoven filaments.

This is a very elegant and obſervable ſpecies, of a fine ſnow white, and of a very great brightneſs; it is of a ſomewhat lax, ſoft and crumbly texture, and extreamly ſmooth and ſilky to the touch; it is found like the two former only in form of veins, and that not in any ſolid ſtrata, but in the large natural nodules of the various coarſe jaſpers, with which ſome part of France and Germany abound; it is not confined to any one ſpecies of theſe, but is found indiſcriminately in all; it forms veins of different breadths in them, but ſeldom in any exceeding half an inch in diameter; theſe are compos'd of two or three, and ſometimes, tho' rarely, four orders of filaments, which are very variouſly diſpos'd, and give the whole a very pleaſing variety of light and ſhade in whatever angle they are placed to the light; they are never found running perpendicularly, but always placed in variouſly angular directions, and not ſtrait or even in themſelves, as thoſe of the ſpecies before deſcrib'd, but variouſly undulated, convoluted and inflected; they are very elegantly interwoven alſo at their commiſſures; and on the whole, give the moſt oddly wav'd and clouded appearance imaginable to the ſurface; it is eaſily pick'd out of the ſtone it is lodg'd in, and then is very fiſſile tho' with great irregularity; its fibres ſometimes cohering ſo firmly as to come off in whole lengths, but thoſe very crooked, and eaſily breaking acroſs; they are a little flexile, and ſomewhat elaſtic, but they eaſily moulder away into a kind of down or woolly ſubſtance between the fingers; they are very eaſily ſeparated longitudinally into a multitude of extreamly minute fibres, which ſeem to have enter'd the ſtructure of the general maſs without having been collected into any faſciæ firſt, and to have been evenly laid together; they are each of the whole length of the order of filaments they belong'd to, and are by no art to be ſeparated farther; theſe are of a ſnow white as is the whole, and are very bright and tranſparent; the maſſes are but ſoft and friable.

They will neither give fire with ſteel, nor ferment with Aqua Fortis, nor ſuffer the leaſt change in the fire; coming out, after a trial of many hours, not only as flexile but as tranſparent as before.

Examin'd by the Microſcope, its filaments appear the moſt looſely and irregularly laid together of thoſe of any ſpecies; they are of various lengths, very variouſly interwoven, and ſeem to have but very little coheſion one with another, the fibres they ſplit into, appear extreamly minute and ſlender, but very perfect and regularly form'd bodies, all of the ſame determinate thickneſs, and all perfectly round; they ſeem, however, to have as little coheſion as the filaments that are compos'd of them one with another, and when we thus examine the ſtructure of the maſſes, it appears wonderful that they can at all hang together.

It is found very plentifully in France and Germany, but is little regarded in either of thoſe countries.

SECT. II. AMIANTHI, compos'd of finer filaments.

1. *Amianthus rigidus, cinereo-vireſcens, filamentis brevibus, abruptis & intertextis, quæ Alumen Plumoſum Officinarum.*

Greyiſh green, rigid Amianthus, with ſhort, abrupt and interwoven filaments; the Plumoſe Alum of the ſhops.

THIS is the Foſſil uſually known in the ſhops under the name of Alumen Plumoſum, tho' it is ſomething wonderful how it came originally to be miſtaken for that ſubſtance, ſince it has neither the taſte, nor any one of the properties or qualities of Alum; it is a very beautiful Foſſil, but of a coarſe, rough, ſhattery and friable texture, eaſily crumbling away, and ſticking to the fingers in handling; it is found in ſmall irregularly ſhaped maſſes, but uſually ſlender and oblong, rarely, tho' ſometimes approaching to orbicular; it is of an extreamly bright and pleaſant colour, an admixture of a ſilvery grey with a very bright pale green; and, when freſh ſplit and view'd in a proper light, is one of the moſt gloſſy bodies in the whole mineral kingdom. It is ever naturally depoſited in the earth, in a contrary direction to the maſſes of the Fibrariæ, their conſtituent filaments ever running perpendicularly, theſe horizontally; ſo that the ends only of this are made of the ends of the filaments, its top, bottom and ſides being of the edges or ſurfaces of them. Theſe, however, are not laid in an even or regular horizontal direction, or in ſtrait lines, but are very ſhort, abrupt, and variouſly interwoven one with another, and rang'd in variouſly oblique directions, making angles of different degrees one with another; all the variety of directions and angles in the maſſes of this, are, however, wholly owing to this different ſite of the filaments, for theſe are in themſelves perfectly ſtrait, and never in the ſlighteſt degree convoluted or inflected. The maſſes are very eaſily fiſſile, the filaments cohering but ſlightly at their ſides, and indeed their intertexture at their ends is not ſo firm, but that the thickeſt ſpecimens are pretty eaſily broken tranſverſely alſo; they are of very gloſſy, but uneven ſurfaces when ſplit longitudinally, or parallel to the direction of the fibres; but when broken tranſverſely, are of extreamly ragged and variouſly ridg'd and furrow'd ends: The filaments, when ſeparated, are found very irregularly compacted into bundles, and from theſe eaſily ſeparate into very thin and fine ones, of different lengths, but pretty equally of the ſame thickneſs; theſe are not to be ſeparated in any great length, and are not very flexile or elaſtic, but conſiderably brittle, very rough and rigid to the touch, and readily crumble to pieces, and are reduc'd to a kind of wool, by ſlightly rubbing them between the fingers. They are very elegantly ſtriated length way, but not at all tranſverſely, and even the naked eye can diſcover in this ſpecies, that what appear only ſtreaks in the Fibrariæ, are no other than ſo many orders of extreamly minute and ſlender fibres compoſing theſe filaments, and which cohering no better mutually at their edges for the conſtituting theſe filaments, than they with one another for the forming the complex maſſes, are as eaſily as thoſe ſplit and ſeparated longitudinally from one another, either by very gently rubbing them between the fingers, or by introducing between or among them the point of a fine needle; the maſſes of this ſpecies are very heavy.

It will neither give fire with ſteel, nor ferment with Aqua Fortis, and ſuffers the moſt extream force of fire without any other alteration, than that it becomes a little whiter, and more hard and rigid: Its texture is never deſtroy'd by it, nor is there the leaſt ſign of calcination manifeſted in it, or the leaſt loſs of weight, after many hours ſtanding the fierceſt, provided that it was thoroughly dry before it was put into it.

Examin'd by the Microſcope, each ſeparated filament appears compos'd of a vaſt number of very minute and ſlender fibres, all perfectly colourleſs and pellucid as cryſtal, all of one and the ſame determinate ſize and thickneſs, all regularly round, and very nearly of the ſame length, and ſo looſely laid together, that they do not touch in many places; and even where they do, ſeem to have but a very ſlight and inconſiderable coheſion. Theſe fibres are alſo again ſeparable into other ſmaller bodies, of multitudes of which they are compos'd, and are therefore, ſtrictly ſpeaking, no other than ſecondary filaments; the bodies they are ſeparable into, are extreamly ſlender and pointed, like ſo many needles, and part ſo freely from one another, that the ſame want of coheſion ſeems evidently to run thro' the maſs in all its degrees of formation; whether theſe are again compounded of others more minute I know not, but the beſt glaſſes at preſent in uſe can aſſiſt us to trace the compages no farther; theſe very freely part on cruſhing or injuring the fibres, and in attempting to bend them, where they break acroſs, are ſeen ſtanding out from their ends, in one, two, or more ſpiculæ of different lengths; from this and a nice obſervation of the filaments themſelves, it will appear, that the order of the formation of the body, is the ſame a Minimis, as far as we are able to trace it to the moſt evident part of its ſtructure: Theſe ſlender Fibrillæ laid longitudinally, but unequally in regard to their lengths together, make up the fibres or ſecondary filaments; and theſe arrang'd in the ſame manner, conſtitute the more obvious and large filaments, which are arrang'd again in the very ſame order, in the conſtitution of the whole maſs; that being made up of filaments ſo ſtrangely interwoven with one another, and form'd into bundles of larger diameters, as before obſerv'd in the ſplitting of the maſs, that their proper length can never be determin'd; and a ſpecimen of an inch or two long, tho' evidently compos'd of many orders of them, can never be aſcertained as to the number, and to an inaccurate eye, might even ſeem to be made up of ſingle, but crooked filaments; and theſe, up as far as we can trace them, made up of others, diſpos'd in the very ſame manner; the woolly or downy ſubſtance, as it appears to be, into which it is eaſily reduc'd by rubbing between the fingers; laid before the Microſcope, is readily ſeen to be no other than a rude congeries of the Spiculæ, before deſcrib'd, irregularly ſeparated, but all of a determinate ſize, and never ſeparated farther than as before deſcrib'd.

It is found in Ægypt, and Africa, and in almoſt all the iſlands of the Archipelago; they have of it alſo in Germany; but the quantities of it brought into Europe for the ſhops are from the Negropont.

It is very happy for us, that Phyſicians have forgot to preſcribe Alumen Plumoſum, ſince the Apothecaries have no idea of any other Foſſil of that name than this, and wou'd inevitably uſe this for it, where it was to be had; how very improper it muſt be for internal uſe, may be judg'd from its effects, when apply'd externally, its Spiculæ making their way into, and lodging themſelves in the ſkin, and occaſioning ſwellings, with the moſt violent and intolerable itching; a ſubject, which my having been much handling it, while writing this account, and ſince thoughtleſsly rubbing my face with part of its Spiculæ remaining on my fingers, makes me at this inſtant able to write very feelingly about.

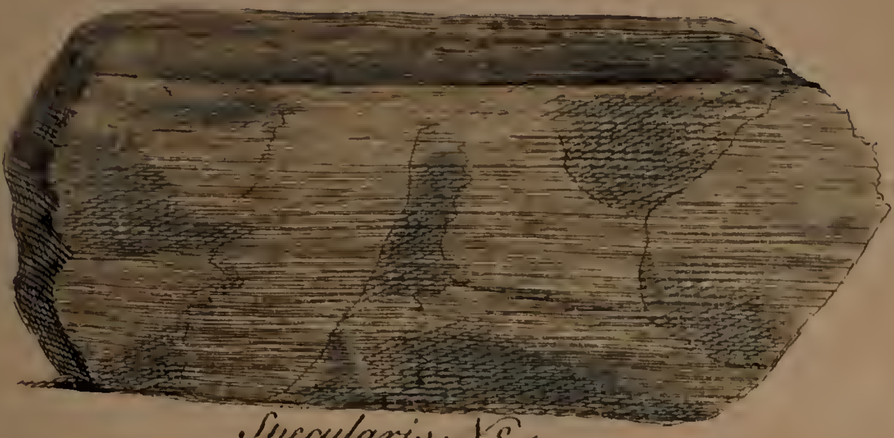
2. *Amianthus mollior, fuſco-virens, filamentis breviſſimis, abruptis, tenuiſſimis & intertextis.*

Greeniſh-brown, ſoft Amianthus, with very ſhort, ſlender, and abrupt filaments.

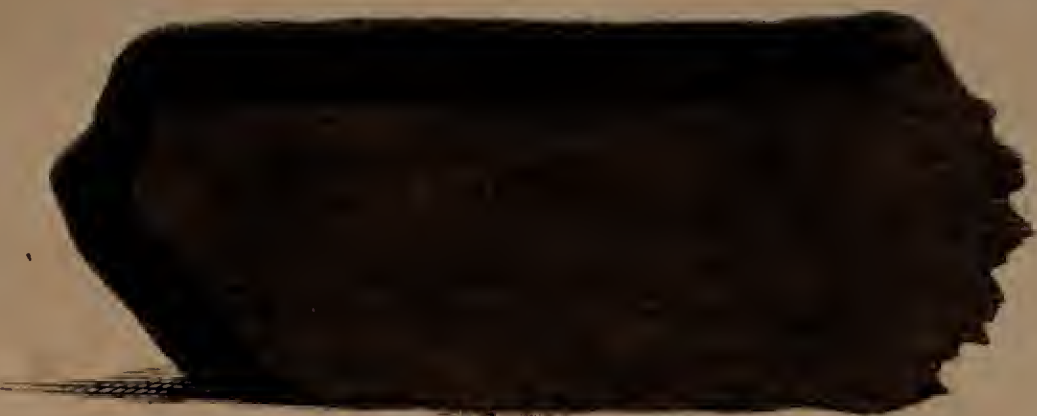
This is an extreamly bright and elegant ſpecies, but is compos'd of the ſhorteſt filaments of any of the whole Genus; it is never found alone in detach'd nodules, or ſeparate maſſes, but makes long and ſlender horizontal veins in the harder ſtrata of marble and lime ſtone; it is often lodg'd in theſe, and in ſuch extreamly narrow beds, that they appear only as ſo many white ſlender veins, and is therefore over-look'd by the very collectors of Foſſils; but ſometimes it forms maſſes of more than half an inch in diameter, running in the form of crooked, but horizontal veins, for many feet in length, and is then ſo obſervable, that the very quarry men don't let it eſcape their notice; it is ever, even in the narroweſt veins, compos'd of ſeveral orders or ranges of fibres, variouſly interwoven one with another, and running nearly perpendicularly, but not perfectly regularly, but ſometimes making conſiderable angles one with another; the narroweſt of theſe veins that I have ever examined, conſiſted of three arrangements of filaments, and thoſe of one third, or the half of an inch, uſually conſiſt of four, five or ſix ranges. Theſe are ever ſo cloſely interwoven at their ends, as to admit no extraneous matter among them, and tho' various in their ſite and direction, and thence giving the whole maſſes an undulated or wav'd look, yet the filaments are in themſelves all perfectly ſtrait; the matter of theſe veins adheres not ſo firmly to the ſtone that it is lodg'd in, but that it may eaſily be pick'd out in ſmall lumps; theſe are very eaſily fiſſile, but the fibres uſually break off in ſeparating, tho' that not at their commiſſures, but in other parts, and are ſeldom to be preſerv'd of any length; they are extreamly flexile, and a little elaſtic, and are eaſily moulder'd between the fingers, into a very ſoft wool like or downy ſubſtance; its filaments cohere but ſlightly together, and are of extreamly bright and gloſſy ſurfaces, before they are rubb'd to pieces, and are ſoft to the touch; the maſſes are conſiderably heavy.

It will neither give fire with ſteel, nor ferment with Aqua Fortis, nor ſuffer the leaſt injury or alteration in the fire; unleſs that inſtead of a duſky, greeniſh brown colour, which it naturally has, it becomes of a dirty whitiſh grey, and its filaments, when ſeparated, are ſomewhat leſs flexile.

Examin'd by the Microſcope, the ſeparated filaments appear very bright, gloſſy, colourleſs and tranſparent; they are, if ſeparated carefully, very thin and ſlender, but of a regularly roundiſh form, and might eaſily paſs for the ultimate fibres of the body; but a little injury either by rubbing, bending or otherwiſe, ſoon diſcovers them to be really compos'd of numberleſs extreamly minute, and even inconceivably fine and ſlender capillaments; firſt bundled into ſmall and ſhort faſciæ or ſecondary filaments, and thence into theſe; no art I cou'd ever uſe has been able to break or divide theſe into ſuch Fibrillæ, as the former kind has its fibres compos'd of, nor the beſt glaſſes

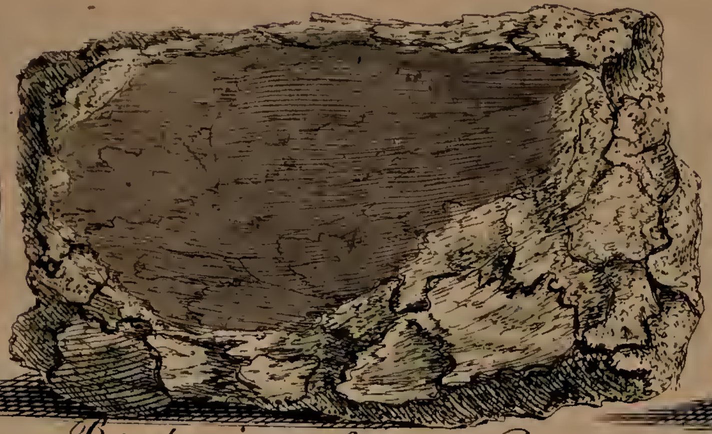


Specularis, N.° 1.

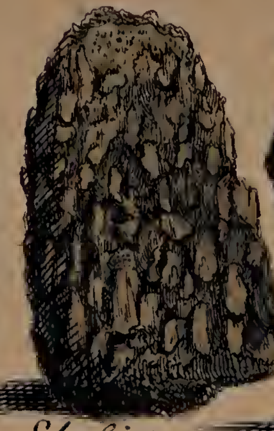


Hyalina, N.° 1.

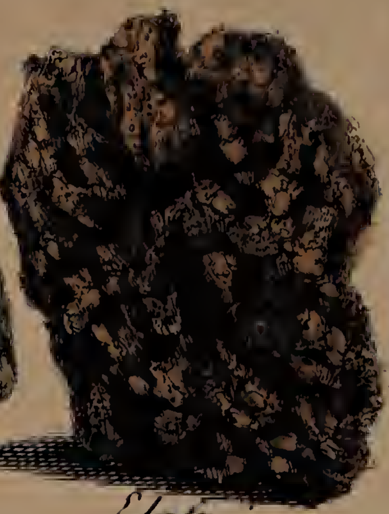
Bractearium, Sect. 1, N.° 2.



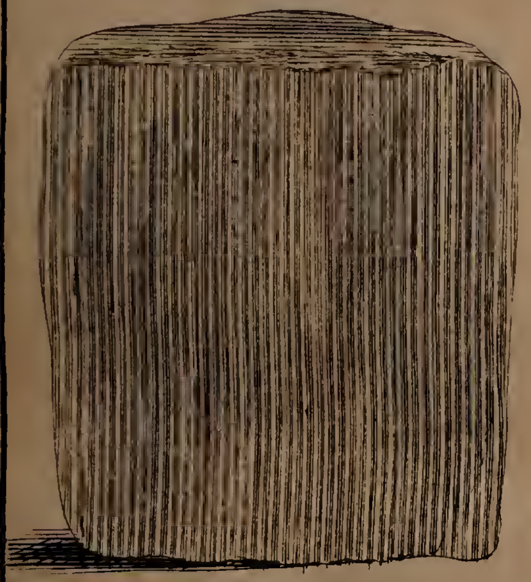
Bractearium, Sect. 2, N.° 1.



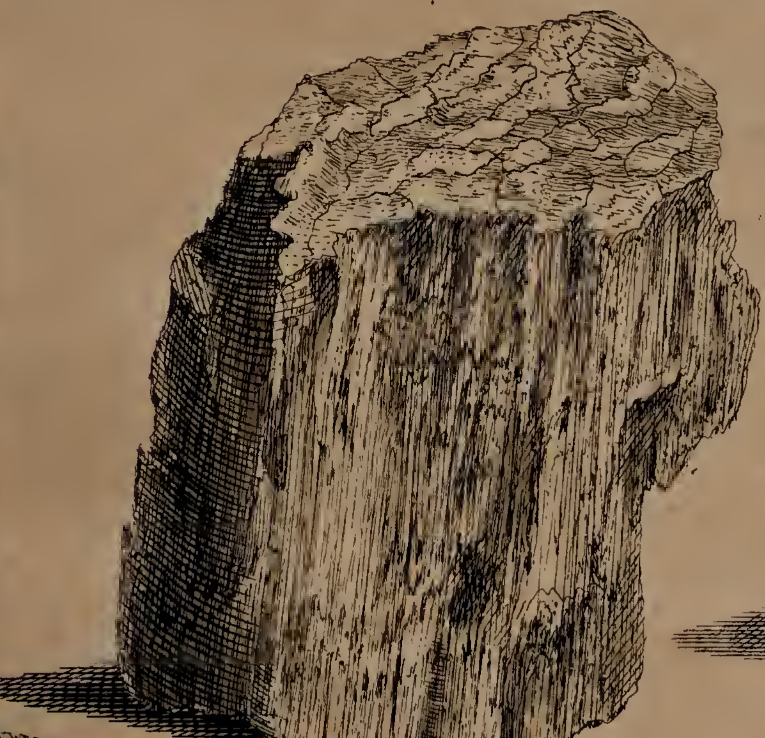
Elaſmis.
Sect. 1, N.° 1.



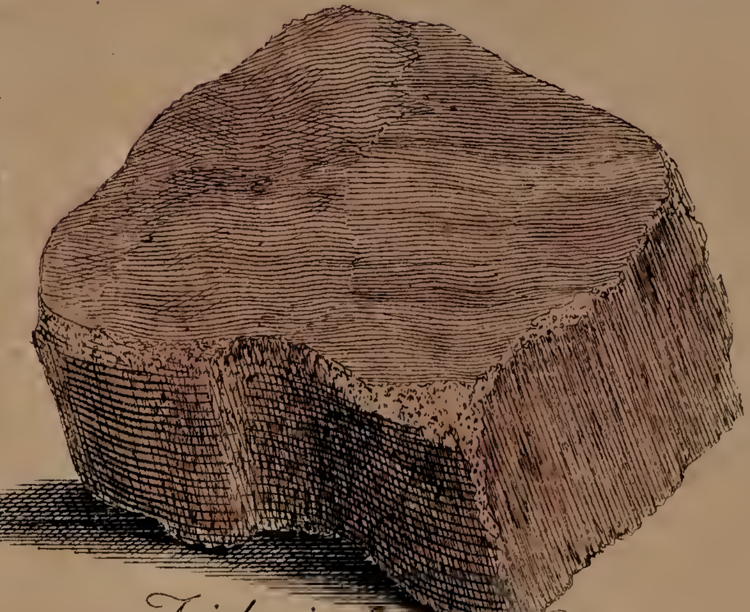
Elaſmis.
Sect. 2, N.° 2.



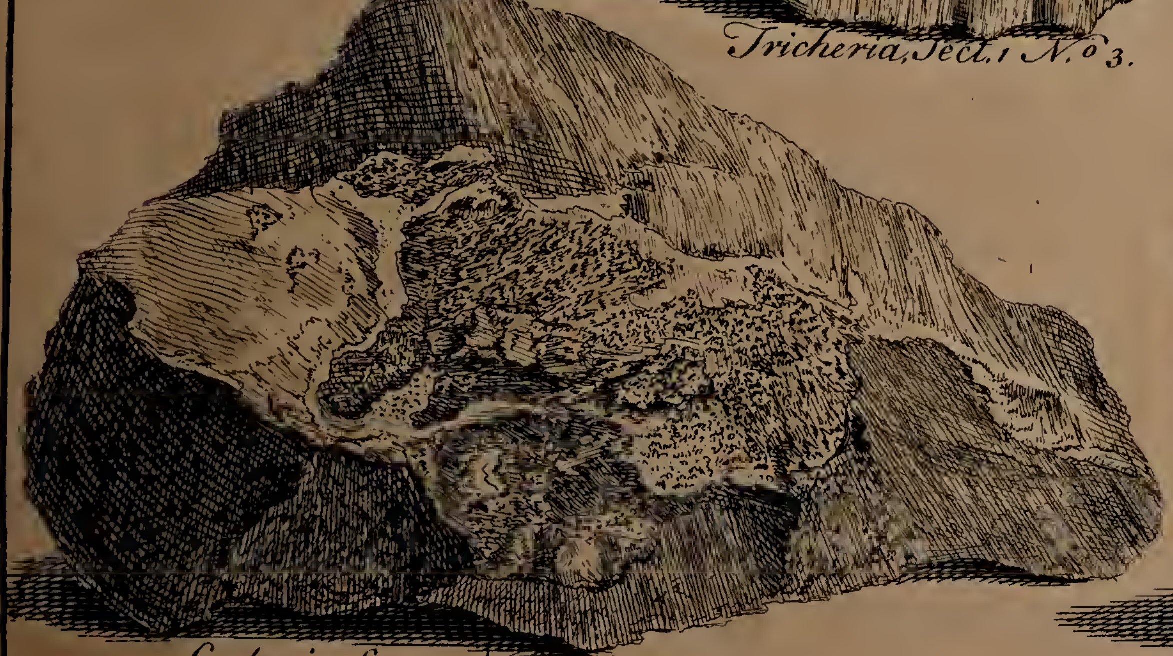
Tricheria.
Sect. 1, N.° 1.



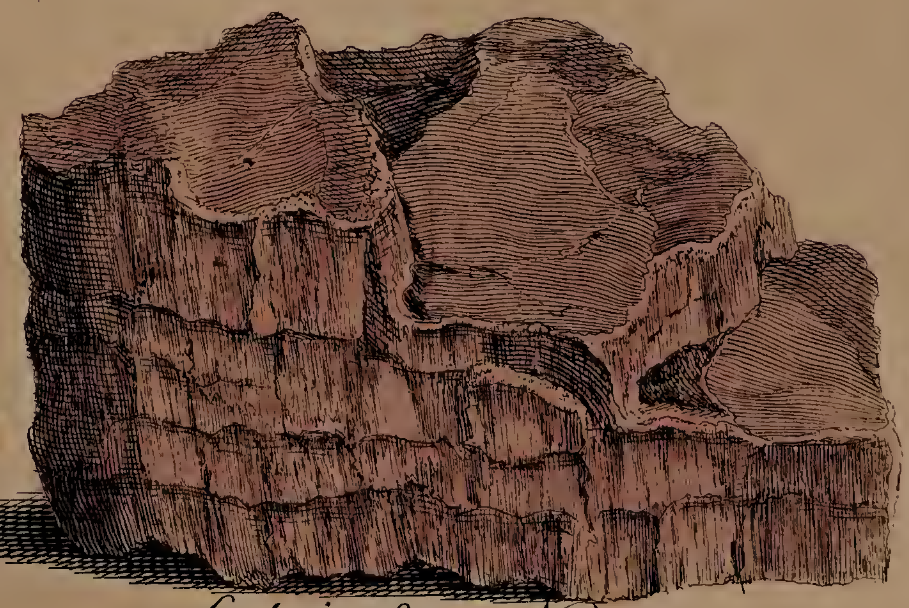
Tricheria, Sect. 1 N.° 3.



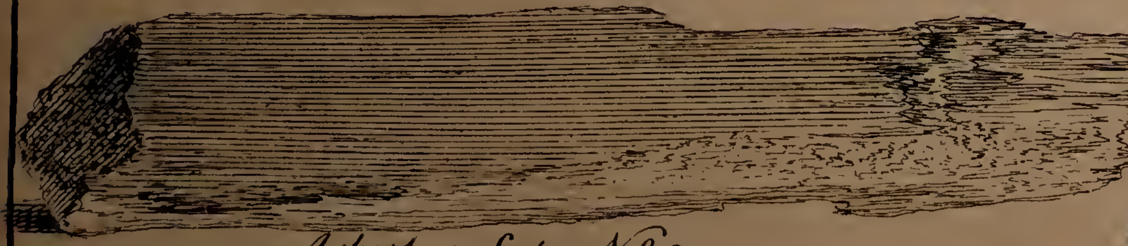
Tricheria, Sect. 2, N.° 1.



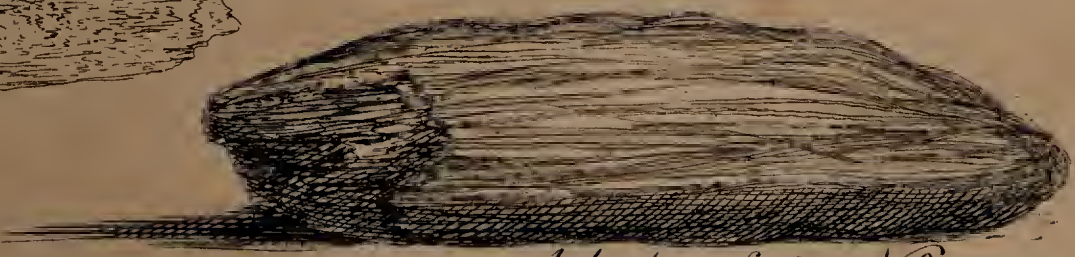
Lachnis, Sect. 1, N.° 2.



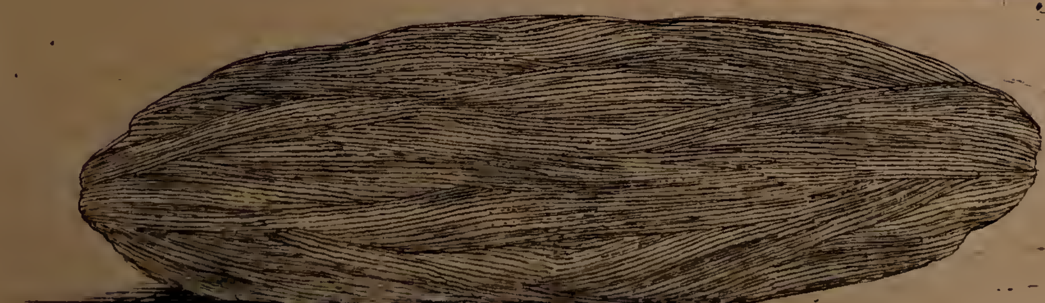
Lachnis, Sect. 2, N.° 1.



Asbestus, Sect. 1, N.° 2.



Asbestus, Sect. 2, N.° 1.



Amianthus, Sect. 1, N.° 2.

to give any room to ſuſpect they were compos'd of ſuch, theſe ſeeming on all examinations the ultimate fibres of this ſpecies.

It is found in the quarries of a greeniſh and greyiſh marble, in many parts of Wales, and in thoſe of a grey lime-ſtone in Yorkſhire: It is found alſo in the green Angleſea marble, and ſometimes, tho' not often, brought over in it among the ſpecimens of the common Angleſea kind.

FOSSILS

NATURALLY and eſſentially ſimple, not inflammable nor ſoluble in water, of a regular ſtructure, but no determinate figure.

Series the ſecond.

Claſs the third.

GYPSUMS.

Foſſils compos'd of ſmall flat particles, irregularly arrang'd, and giving the whole maſſes ſomething of the appearance of the ſofter marbles, bright, gloſſy, and in ſome degree tranſparent, not flexile or elaſtic, not giving fire with ſteel, nor fermenting with, or being ſoluble by Acid Menſtrua, and very eaſily calcining in the fire.

Of this Claſs are two orders, and under theſe four Genera.

Order the firſt.

Gypſums of a firm compact texture, and conſiderably hard.

Order the firſt.

Gypſums of a lax, looſe texture, and ſoft and crumbly.

GYPSUMS.

Order the firſt.

Genus 1. PHOLIDES. *Harder Gypſums, compos'd of ſomewhat broad particles, and of a bright cryſtalline luſtre.*

Genus 2. LEPIUM. *Harder Gypſum, compos'd of very ſmall particles, and of a leſs glittering hue.*

GYPSUMS.

Order the ſecond.

Genus 1. TEMACHIDES. *Softer Gypſums, bright and glittering.*

Genus 2. CLASMIUM. *Softer Gypſum, more dull and opake.*

SERIES II.

CLASS III. ORDER I. GENUS I.

PHOLIDES.

HARDER Gypſums, compos'd of ſomewhat broad particles, and of a bright cryſtalline luſtre.

1. *Pholis marmorea, albida, lucida, durior.*
Hard, white, ſhining, marbly Pholis.

This is a very elegant and very valuable Foſſil, well known to the world by the name of plaiſter of Paris ſtone, Parget ſtone or plaiſter ſtone of Mont Martre, the name of the place in France, where it is dug in greateſt abundance. It is a very pure and beautiful ſubſtance, of a conſiderably fine and extreamly bright and gloſſy ſubſtance where freſh broken, and of a very cloſe, firm and compact texture; it is ſomewhat ſoft and ſmooth to the touch, and is found in maſſes of different ſizes, from three or four inches, to as many feet in diameter, of no determinate ſhape or figure, but uſually ſomewhat flatted; it is often of a pure and perfect white, tho' at times ſomewhat browniſh; in either caſe, however, it ſo exactly reſembles in ſtructure and appearance a lump, either of finer or coarſer loaf ſugar, as not to be eaſily diſtinguiſh'd from it by the ſight alone. When broken, it appears of a cryſtalline luſtre and brightneſs, and is ſeen to be compos'd of ſmall flat particles, very irregularly and unevenly laid together, and in ſome places faintly emulating a foliated texture; it is eaſily broken as are all the Gypſums; but is not ſo ſhattery or friable as moſt of the other kinds; a ſmall piece of it rubb'd between the thumb-nails, eaſily moulders into a fine white opake powder; it breaks with equal eaſe in all directions, and is very heavy, naturally gloſſy, even on the ſurface, if not dirty or injur'd by accidents; and if held up againſt the light is tranſparent, even in conſiderably thick pieces.

It will neither give fire with ſteel, nor ferment with Aqua Fortis, but very freely and readily calcines in the fire into a fine plaiſter.

Examin'd by the Microſcope it appears a very elegant and beautiful object; it is plainly compos'd of flat particles, very irregularly arrang'd, of a moderate degree of tranſparence, but in brightneſs equal to the fineſt cryſtal; crumbled into its conſtituent particles, and examin'd with the double Microſcope, theſe all appear to be regular bodies, angular, oblong and flat, perfectly pellucid, and not plated, or compos'd of ſeveral flakes, but each one ſingle maſs; great care is to be taken in procuring them unhurt for this examination; ſince when they are injur'd in the rubbing to powder, many of them appear mutilated.

It is dug in many parts of France, but no where ſo abundantly, or ſo good as near Mont Martre. I cou'd never yet find that we have this kind, or any perfectly equal to it in England: Our Workmen flatter themſelves, that the finer Derbyſhire kind, next deſcrib'd, is the ſame with that of Mont Martre, but they err in this. Its uſes in buildings, and in caſting ſtatues, are well known.

2. *Pholis marmorea, lucida, durior, albo & rubro variegata.*
Hard, ſhining, red and white marbly Pholis.

This a ſpecies very different from the former, yet of conſiderable uſe and beauty. It is of an extreamly irregular, rough, coarſe and unequal texture, not at all ſoft to the touch, but very agreeably variegated in colour, with a fine bright white, and a duſky pale red; the white is uſually the ground, and the red is lodg'd in form of veins, clouds and ſpots in it. It is found in maſſes of no determinate ſhape, uſually ſomewhat flatted, and of very rugged and unequal ſurfaces; theſe are the largeſt of thoſe of all the Gypſums, being often found of four or five feet in breadth, and three in thickneſs; they are of a rude, duſky and dark ſurface, but when broken, appear very bright and gloſſy. This is of all the ſpecies the moſt irregular in its ſtructure, and that not only in different ſpecimens, which might induce one to think of different ſpecies of it, but frequently in the different parts of the ſame maſs, in ſome of which it will emulate a flaky or foliaceous texture, and in others a regularly complex ſtriated one, compos'd of extreamly ſhort fibres; where it is moſt evenly conſtructed, and its conſtituent particles can be ſeen with any diſtinction, they appear longer and narrower than thoſe of the before deſcribed ſpecies, and the whole variety of their appearance in the other parts of the maſs, is from their different arrangements; they are very cloſely, tho' very irregularly laid together in theſe parts, and when their ſurfaces are brought into view, a multitude of them together make a ſort of complex plane, like the flakes or ſmall plates of ſome of the foliaceous Foſſils; when their edges are ſeen as cloſely arrang'd, they cannot but make a ſeries of apparent ſhort filaments, and conſtitute the figure of a ſtriated texture, with the fibres of this ſhortneſs. It is ſomewhat compact and firm, and does not break ſo eaſily as the reſt, and uſually gives a very rugged and uneven ſurface; reduc'd into ſmall pieces it may be crumbled between the thumb nails, into an opake whitiſh powder. It has very little brightneſs on its natural ſurface, but when held up againſt the light in pieces not too thick, is moderately tranſparent, and always much more ſo in its white parts than in the red.

It is heavier than any other ſpecies, and will neither give fire with ſteel, nor ferment with Aqua Fortis.

It burns more ſlowly into a plaiſter than the former ſpecies, and is never ſo well colour'd, otherwiſe it is equal to that made from it.

Examin'd by the Microſcope, it appears in the maſs of a very various ſtructure, but compos'd of particles all much of the ſame ſize and figure, and only affecting a varied form from their different combinations, or the ſides they preſent to the view; they are all very bright and gloſſy, but the flaky ſpecks more ſo than the reſt, as there the flat ſurfaces are in view, not the edges of the particles, as in thoſe parts where there is the appearance of ſtriæ. The ſeparated particles examin'd by the double Microſcope, are ſeen to be all regular bodies, all of the ſame figure, and very nearly of the ſame ſize, unleſs where alter'd or mutilated in the ſeparating; they are all very long in compariſon of thoſe of the former ſpecies, and all angular, and very flat and thin, each being ever a ſingle plate as in the reſt.

It is dug in great Plenty in Yorkſhire, and in ſome parts of Derbyſhire; the maſſes of it ſometimes conſtitute immenſe ſtrata, as in the other kinds, and ſometimes lie looſe, and at diſtances in the ſtrata of a reddiſh Marle.

SERIES II.

Class III. Order I. Genus II.

LEPIUM.

HARDER *Gypſum, compos'd of very ſmall particles, and of a leſs glittering hue.*

Of this Genus we have only one known ſpecies.

1. *Lepium albido-cinereum, durius, hebes.*
Hard, greyiſh-white, dull looking Lepium.

This is one of the leaſt valuable and moſt impure of this claſs; it is of an extreamly rude, irregular, coarſe and unequal ſtructure, a little ſoft to the touch, of a very dull appearance, and of different degrees of a greyiſh white; the two colours are variouſly mingled in the different ſpecimens, ſome of which are perfectly uniform in colour, others whiter in ſome parts, and greyer in others, and others of a tolerably clear white ground, but vein'd and ſpotted with grey. The grey in this ſpecies has ſometimes alſo a caſt of bleuiſhneſs, and ſometimes of greeniſh; there is a great difference between theſe grey veins, and thoſe of the red in the Yorkſhire red and white Gypſum, before deſcrib'd;

thoſe probably owe their colour to a ſmall admixture of a red earth indeed, but that in ſo inconſiderable a quantity, that the Gypſum is but little debas'd by it, and keeps in a great meaſure its natural texture and tranſparence; in this, on the contrary, the colour is owing to an admixture of a greeniſh grey marly earth, and that in ſo large a quantity, as in many places abſolutely to deſtroy the natural texture and brightneſs of the ſtone, and give it the appearance only of a mere earth. It is found in maſſes of a very irregular and uncertain ſhape, and of different ſizes, but their uſual ſtandard is about ſix or ſeven inches broad, and three inches in thickneſs; the ſurface is uſually very rough, rugged and uneven, and of a coarſe, dull and dead look; when broken it has ſome gloſs, but nothing of the ſparkling appearance of moſt of the other kinds, but affects ſomething of a foliaceous or flaky texture. It is very compact and hard, and breaks irregularly and uncertainly, and ever with a very uneven ſurface; it does not, like the reſt, break with equal eaſe in any direction, but much more readily ſplits horizontally, tho' with no great regularity; it is not ſo eaſily moulder'd to powder between the fingers as the other kinds, and much leſs eaſily in the greyer than in the whiter parts, the earth taken up into theſe, ſerving as a band of union, and making the whole much more firm than when the coheſion depends only on that of the particles mutually with one another.

It has very little tranſparence, if held up to the light, even in the thinneſt pieces, and will neither give fire with ſteel, nor ferment with Aqua Fortis; and calcines but very irregularly and uncertainly, and that into a foul and impure plaiſter.

Examin'd by the Microſcope it appears in the maſs compos'd of very thin and ſmall particles, naturally combining flatwiſe into a ſort of broad, but irregular and ſcaly flakes. Its particles ſeparated and examin'd by the double Microſcope, appear extreamly broad and thin; but wherever perfect and uninjur'd, are of a regularly angular figure, and determinate ſize; they are almoſt every where combin'd into complex flakes, which are never very thick, ſeldom perfectly even, but uſually undulated or bent, and ſeem but of a very lax and incoherent ſtructure.

It is found in great plenty in Germany, and is one of the many different ſubſtances, which from their uſe in metallurgy, in fuſion and caſting, the Germans call Spaad. We have of it in great plenty in Derbyſhire, and it is burnt into plaiſter for the coarſer works; it calcines very ſlowly and unequally, as may be naturally expected from its large admixture of earth; and makes but a very coarſe and ordinary plaiſter. I have ſeen of it about Mount Sorrel in Leiceſterſhire alſo, and in ſome parts of Yorkſhire, but it is not us'd in either of thoſe places.

SERIES II.

CLASS III. ORDER II. GENUS I.

TEMACHIDES.

SOFTER Gypſums bright and glittering,

1. *Temachis mollior, lucida, vireſcens.*
Soft, ſhining, green Temachis.

This is a very beautiful and withal a very valuable ſpecies. It is of a coarſe, harſh, lax and friable ſtructure, but very ſoft to the touch, extreamly bright and gloſſy, and of a ſtrong deep but ſomewhat duſky green; it is found in maſſes of no determinate ſhape or ſize, but uſually of very rugged ſurfaces, and very flat. It is not ſo large as the other kinds uſually are, few ſpecimens of it having been found of more than four inches broad, or more than one inch in thickneſs; it is of a very unpromiſing aſpect, very dull and of a duſky browniſh hue on the outſide; but when broken it appears extreamly gloſſy, and ſhews its ſtrong and beautiful colour: It is compos'd of an aſſemblage of ſhort, flat particles, neither emulating the ſtriated, nor the fo-

foliated texture of ſome of the ſpecies, but arrang'd in perfect irregularity, and plac'd ſo looſely as to give the ſtone a ſomewhat ſpungy appearance; it is extreamly ſoft and friable, breaks with equal eaſe in all directions, and in ſmall pieces is very eaſily crumbled between the fingers to a fine powder, reſembling a ſhining or talcy ſand. It has no gloſs upon its natural ſurface in any part, but held up againſt the light, even in pretty thick maſſes, is very beautifully tranſparent, and of a fine deep emerald green.

It is conſiderably heavy, but will neither give fire with ſteel, nor ferment with Aqua Fortis.

In the fire it very freely and readily calcines into a pure and ſnow white Gypſum; its green colour, tho' ſo very deep and ſtrong, perfectly going off even before the calcination is finiſh'd.

Examin'd by the Microſcope, it makes a more beautiful appearance than is eaſily to be conceiv'd; its ſeveral particles looking of an elegant green, and of the brightneſs of ſo many emeralds. Theſe cohere ſo very ſlightly, that they are eaſily ſeparated without injuring them; and plac'd thus ſeparated before the double Microſcope, are ſeen to be very perfect and regularly figur'd bodies, all oblong and angular, and all of one and the ſame ſize.

It is found in great plenty on the ſhores of the rivers in the Eaſt-Indies, and in no other part of the world ſo far as I have yet heard. It wou'd make an excellent plaiſter for the finer works of caſting, &c. but is not known there in that quality; they powder it without calcination, which is very eaſily done, and give it in Nephritic caſes, it is ſaid with great ſucceſs.

Dr. Woodward mentions what he calls a fibroſe Talc under the name of Paſhanna Beady, from the Eaſt-Indies, us'd in the ſame intentions; but as he has given no deſcription of that body, it is impoſſible to ſay whether it be the ſame, eſpecially as under a claſs it does not belong to: In this, however, the Doctor is the more pardonable if it be ſo, ſince having eſtabliſh'd no Genus for the Gypſums; he cou'd no where more properly place what ſpecimens of them came to his hands, than among the fibroſe Talcs, of whoſe texture and ſubſtance, tho' not ſtructure, they aſſuredly are.

The texture of all the bodies of this claſs being ultimately the ſame, it may be ſufficient to obſerve at once, that their origin is plainly from particles of a determinate nature and ſubſtance, and of a certain and invariable figure, an oblong, flat and irregularly angular one. Theſe we ſee ſometimes, as indeed is moſt natural to them, diſpos'd without order or regularity, into looſe, complex, friable maſſes; at others they are getting out of their native order, and emulating the ſtructure of other claſſes of bodies, of which they are indeed ever properly the baſis, and appearing ſomewhat in the figure of the Fibrariæ; and at other times of the foliaceous compoſit flakes of the Selenitæ; the ſpecies which have theſe ſtructures are truly varying from the Gypſums into thoſe bodies they emulate, for the Fibrariæ are only a peculiar arrangement of theſe very particles, and the Selenitæ only more broad flakes of the ſame, like thoſe of the foliaceous Talcs.

2. *Temachis marmorea, albida, mollior.*
Soft, white, marbly Temachis.

This is a ſubſtance well known among the workmen, under the name of the Derbyſhire plaiſter-ſtone. It the moſt of all our kinds approaches to the Mont Martre kind, before deſcrib'd, but does not nearly come up to it, either in beauty or in value.

It is of a conſiderably fine, but irregular and lax texture, a little ſmooth and ſoft to the touch, and of a tolerably clear white when pure, tho' uſually ting'd with browniſh, blueiſh or reddiſh. It is found in maſſes of no determinate ſhape, but uſually unequal on their ſurfaces, and inclining to flatneſs; theſe are of very various ſizes, ſome not exceeding the bigneſs of an egg, others being found of two or three feet in diameter; they are uſually opake and of a duſky browniſh white without, but when broken they are conſiderably bright and gloſſy, but that not equally and univerſally ſo, as the Mont Martre kind is, but much more in ſome parts than others; and if nicely examin'd, this will be found compos'd of particles of very various ſhapes and ſizes, the larger very bright, the leſſer more opake. It is of a ſoft and friable texture, breaking eaſily with a ſmall force, and that equally in all directions, tho' ſeldom giving a very even ſurface where it parts; it has much of the ſugar-like appearance of the former, but leſs than that, becauſe of its leſs regular texture, and in ſmall pieces may be eaſily rubb'd between the fingers to an opake white powder. It is externally but of little brightneſs, but held up againſt a good light, in pieces not too thick, is tolerably pellucid.

It is conſiderably heavy, and will neither give fire with ſteel, nor ferment with Aqua Fortis, but pretty freely calcines into a very white, and very valuable plaiſter.

Examin'd by the Microſcope it appears very beautifully bright and gloſſy; in ſome parts, not much leſs ſo than the Mont Martre kind, but in others of a more rude ſtructure, compos'd of aſſemblages of very minute particles, and very inferior to the reſt in ſplendor, carefully rub'd to powder between the fingers, and view'd in that ſtate before the double Microſcope. Its particles appear moderately tranſparent, oblong, angular and conſiderably thick; they are much longer and leſs pellucid than thoſe of the former ſpecies, and are mix'd with a great number of ſmaller and very irregularly ſhap'd ones; the larger are very plainly regularly conſtructed bodies of determinate figures, and all very nearly of the ſame ſize, as they alſo are in the Mont Martre kind.

This is found in many parts of Derbyſhire, and dug with great advantage for working into what is call'd plaiſter of Paris, for ſtuccoing rooms and caſting buſts and ſtatues; the ſtriated Talcs all ſerve for the ſame purpoſes, but they are leſs valu'd, as they never coaleſce ſo evenly or uniformly after wetting.

3. *Temachis marmorea, lucida, mollior, pallide-fuſca.*
Soft, pale-brown, gloſſy, marbly Temachis.

This is a very ſingular ſpecies, and tho' leſs beautiful than ſome of the reſt, is well worth enquiring after, in the places where it is to be had, as affording a plaiſter ſuperior to any except that of Mont Martre, and the pureſt of the finer Derbyſhire kind. It is of an extreamly irregular, rough, and coarſe texture, very harſh to the touch, and of a dull, diſagreeable, very pale brown; it is found ever in very broad, flat and thin maſſes, ſome of them only a few inches diameter, and very few of ſo much as a foot, and ſeldom more than three inches in thickneſs; theſe are ever of a rude and unequal ſurface, and very unpromiſing appearance, they are perfectly opake and dull on the outſide, but when broken appear of a looſe but truly marbly texture, extreamly bright and gloſſy, and compos'd of particles very large and broad, tho' not over long; and theſe ever throughout all parts of the maſſes looſely arranged together, and never emulating either a ſtriated or foliaceous appearance, but only making a looſe, uneven congeries. It may be eaſily imagin'd from this ſtructure, that this ſpecies is very ſoft and friable; it is indeed the moſt ſo of all the known kinds, and is from ſmall pieces very eaſily crumbled between the fingers to a looſe whitiſh powder; in all theſe bodies there is, however, between them and the laxer ſand-ſtones, many of which may be rub'd to powder between the fingers in the ſame manner, this great difference, that the ſtones can only be reduc'd into their conſtituent particles of grit, and theſe are not at all to be affected by mere rubbing; whereas the Gypſums are ſo eaſily injur'd in the very particles of their grit, as theſe determinately ſiz'd particles may properly enough be called, that it is a very nice matter to avoid deſtroying their form by the ſlighteſt degree of rubbing, beyond juſt what is neceſſary to break their coheſions, and ſeparate them from one another; and often even by that they are many of them broken and greatly alter'd. This ſpecies, tho' of great brightneſs where freſh broken, is very imperfectly tranſparent, even when held to the light in ever ſo thin pieces.

It is very heavy and will not give fire with ſteel, nor ferment with Aqua Fortis, but very freely and readily calcines into a pure white, and very valuable and excellent Gypſum.

Examin'd by the Microſcope in the maſs its particles appear very bright and gloſſy, but laid together in a very lax and very diſorderly manner; when ſeparated and view'd by the double Microſcope, they appear moderately tranſparent of very very regular, ſizes, and of ſomewhat angular figures, but all broad and ſhort and not over thick.

It is found in ſome parts of Germany where it is extreamly valued, and beſide the common uſes in plaiſtering and ſtatuary, is much eſteem'd by the metallurgiſts for an ingredient in the compoſition of their teſts; we have of it in Derbyſhire, but its unpromiſing face makes it diſregarded, and either thrown by or mix'd among the other kinds for ordinary uſe.

SERIES II.

Class III. Order II. Genus II.

CLASMIUM.

SOFTER *Gypſum, more dull and opake.*

Of this Genus, we have only one known Species.

1. *Claſmium mollius, hebes rubeſcens.*
Soft, dull looking red Gypſum.

This is a very ſingular and remarkable Gypſum, and tho' of no great brightneſs, yet is of ſo elegant a colour, as to appear as beautiful a ſpecies as any one of the claſs; it is of a tolerably regular and even ſtructure, but very coarſe, harſh and rough, it is hard and rugged to the touch, and of a very lively and beautiful pale red, and is found in large, rugged and irregularly ſhap'd maſſes, but differing from all the reſt in this, that as they affect a flatneſs, this is generally as thick as broad; it is found ſometimes in very ſmall nodules not larger than a walnut, and at others, in maſſes of eight or ten pound weight: it is of a very rude, dull and cavernous ſtructure on its ſurface, and is more than any other kind ſubject to cracks which run irregularly, and ſeldom enter very deep into its ſubſtance; when broken, it appears ſomewhat ſparkling in ſome parts, but much leſs ſo than moſt of the other Gypſums, and manifeſtly emulates throughout its whole ſubſtance, and obſcurely and irregularly ſtriated texture; different ſeries of ſhort lines or ſtriæ are ſeen in all parts of it, variouſly mingled among and interſecting one another, but all rang'd in ſomething tending to an horizontal direction, none of them running directly acroſs one another; it is very friable, and breaks with moſt eaſe in a perpendicular direction, and generally gives a tolerably even and regular ſurface; in ſmall pieces it is very eaſily crumbled to powder between the fingers; it is not only dull externally in the maſs, but even in very thin pieces, and held up againſt a ſtrong light, has little or no tranſparence; it is moderately heavy.

It will neither give fire with ſteel, nor ferment with Aqua Fortis.

It calcines very freely and very equally in the fire, and affords a very valuable and excellent plaiſter.

Examin'd by the Microſcope, it appears wholly compos'd of extreamly thin, very long, and withal very narrow particles; theſe are in many parts collected together but with no ſort of regularity, into lax maſſes andinothers they are lodg'd evenly ſide by ſide together, with their flat ſurfaces in an horizontal direction, in the natural ſituation of the maſs while in the earth; theſe form alſo numbers of maſſes which are laid together with no great regularity, but chiefly in one direction; and when the ſtone is broken tranſverſely, as it moſt naturally breaks that way, not horizontally as ſome others do, theſe congeries of plates having their edges only expos'd to view, give the appearance of irregular orders of filaments making ſtriæ.

There is ſomething ſingular in this ſpecies breaking moſt readily perpendicularly, when the reſt are more diſpos'd to ſplit or ſeparate horizontally, but the Microſcope eaſily explains the cauſe of it; the particles it is compos'd of are long, lax, and friable, but they are of flat ſurfaces, and cohere very firmly where they come in contact with them; this being then the caſe in the horizontal direction of the ſtone, and giving it a firmneſs that way, and the filaments themſelves being but weak, it is no wonder that it more readily breaks thro' their ſubſtances than thro' the coheſions of their flat ſurfaces; if a broken edge of this ſpecies be carefully examined by a good Microſcope, it will always be diſcover'd accordingly that the fibres, if its particles may, when view'd in this direction, be ſo call'd, have moſt frequently ſeparated in their own maſſes, not at the commiſſures of the ſeveral ranges of them; but this being the caſe in moſt other ſuch bodies is the leſs wonderful.

The double Microſcope, ſhews the ſeparated particles of this ſpecies ſmooth, gloſſy, and moderately tranſparent; but it is not eaſy to know their figure by it, as they are ſo ſoft and friable, that they are uſually much injur'd, mutilated and broken in the ſeparating them.

It is commonly in Italy; and greatly eſteem'd there; we have of it in Derbyſhire, and Yorkſhire, and in ſome places in great plenty, but it is never particularly regarded with us, but burnt among the reſt.

FOSSILS

NATURALLY and eſſentially ſimple, not inflammable nor ſoluble in water.

Series the third.

Thoſe of a regular ſtructure, and a determinate figure.

Of this Series there are three claſſes.

The firſt of thoſe compoſ'd of ſlender filaments, rang'd into even and parallel plates, The SELENITÆ.

The ſecond of thoſe of angular figures, very bright, giving fire with ſteel, and not fermenting with Acids, CRYSTALS.

The third of thoſe of angular and indeterminate figures, of a cryſtalline appearance, but leſs bright, not giving fire with ſteel, and fermenting with acid Menſtrua, SPARS.

It is to be obſerv'd, that though the bodies of this Series are in general of determinate figures, yet nature does not give us theſe arrangements in perfect regularity; for there are a few inſtances of true Selenitæ, true Spar, and even Cryſtal, which are not of their proper figures.

Series the third.

Claſs the firſt.

SELENITÆ.

Foſſils compos'd of ſlender filaments, rang'd into fine, even and thin flakes, and thoſe diſpos'd into regular figures in the different Genera approaching to a rhomboide, a hexangular column, or a rectangled inequilateral parallellogram, Fiſſil like the Talcs; but that not only horizontally, but perpendicularly alſo, flexile in a ſmall degree, but not at all elaſtic; not fermenting with Acid Menſtrua, and readily calcining in the fire.

Of this claſs there are ſeven orders, and under thoſe ten Genera.

Order the firſt.

Selenitæ with horizontal plates, approaching to a rhomboidal form.

Order the ſecond.

Selenitæ with horizontal plates, of a columnar and angular form.

Order the third.

Selenitæ, whoſe filaments are ſcarce viſibly arraing'd into plates, but in the whole maſſes appear ſtriated, not tabulated.

Order the fourth.

Selenitæ, flat, but of no determinately angular figure.

Order

Order the fifth.

Selenitæ, form'd of plates perpendicularly arrang'd.

Order the ſixth.

Selenitæ, form'd of congeries, plates rang'd in form of a ſtar.

Order the ſeventh.

Selenitæ, of a complex and indeterminate figure.

SELENITÆ.

Order the firſt.

Genus 1. LEPTODECARHOMBES. *Selenitæ conſiſting of ten planes, each ſo nearly equal to that oppoſite to it, as very much to approach to a decahedral parallelopiped, tho' never truly or regularly ſo: Two of the planes in this, which may properly enough be call'd the top and bottom in this Genus, are ever broader and flatter than the reſt; and theſe, tho' not regularly equal, uſually very nearly anſwer one another, as do alſo the other eight in two ſets of fours.*

There are four ſhorter planes meeting in ſomewhat acute angles, two and two from the ends, or two ſhorter edges of the two flat and broad Rhomboidal planes before deſcrib'd; and four longer meeting in more obtuſe angles, from the ſides or longer edges of the ſame Romboidal planes.

As the broader and flatter planes, or top and bottom in this Genus, are not regularly equal to each other, ſo neither are the eight narrower to their oppoſites, but there are uſually differences in their angles and in the breadth of them.

Genus 2. PACHODECARHOMBES. *Selenitæ conſiſting of ten planes, as the former Genus; but as the top and bottom of that are broader and larger planes than any of the others, on the contrary, the great thickneſs of this Genus makes its Trapezia, or four longer planes meeting in an obtuſe angle from its ſides, its largeſt planes.*

The four ſhorter planes in theſe decahedral Rhomboides in both Genera, uſually form either right angled, inequilateral parallellograms, or Rhomboides; and as the ſite and figures of the ſeveral planes are thus determin'd, it may not be improper, to prevent a multiplicity of words hereafter, to call the two flat Rhomboidal planes broadeſt in the firſt Genus, and ſmaller in this, the top and bottom; the two ſhorter edges of theſe the ends; and the two longer the ſides; the four ſhorter planes meeting in more acute angles from the ends, the Rhombs; and the four longer planes meeting in more obtuſe angles from the ſides, the Trapezia.

This, tho' the planes call'd by theſe names do not always exactly anſwer the character, will ſave a multiplicity of words in the deſcriptions of the ſeveral ſpecies in which we ſhall accordingly call that part in Tab. 2. *Fig.* 1. *expreſs'd by the letter* a. *its top; the plane anſwering to it on the other ſide of the body, its bottom; the edges mark'd* b. b. *Its ends, thoſe mark'd* c. c. *Its ſides, the two ſhorter planes, mark'd* d. d. *and their oppoſites the Rhombs, and the two longer planes* e. e. *with their oppoſites the Trapezia.*

Genus 3. TETRADECARHOMBES. *Selenitæ whoſe top and bottom, ends, ſides, and Trapezia, are of the ſame figure with thoſe of the decahedral; but the Rhombs in this are each divided into two, making in the whole eight inſtead of four.*

A Selenites of this Genus conſiſts therefore of a top and bottom, four Trapezia and eight Rhombs; as the ſides and not the ends of the filaments which compoſe the plates are liable to this ſubdiviſion, and the Rhombs only ſhew it, it follows, that all theſe muſt be tranſverſely ſtriated.

The ſtructure of theſe three Genera of the Selenitæ is exactly alike, they are all compos'd of a great number of broad flakes, or plates, in a great meaſure externally reſembling the flakes of the foliaceous Talcs; theſe are of the breadth of the whole maſs, the top and bottom being each only one ſuch plate, and thoſe between them in like manner,

manner, each compleat and ſingle; and the body may always be eaſily and evenly ſplit and ſeparated longitudinally, or according to our determination of the top and bottom of the maſs, horizontally according to the direction of theſe; theſe plates or flakes differ, however, extreamly from the Talcs, if nicely examin'd; for they are each compos'd and wholly made up of a multitude of fine and ſlender threads, and will alſo pretty eaſily and regularly break according to their direction; theſe threads are uſually diſpos'd parallel to the ſides of the body, tho' ſometimes they are found parallel to their ends; in many of the ſpecies they ſeem alſo not to run evenly thro' the whole breadth of the maſs, but are divided by other parallel lines plac'd at a greater diſtance from each other; where theſe lines, whether the cloſer or more diſtant, or both, are very ſtrong, the body will ſeldom ſeparate into whole flakes by ſplitting it like the Talcs; but the plates uſually break off at ſome of theſe lines, and fall to pieces according to their direction.

SELENITÆ.

Order the Second.

As the three former Genera of the Selenites very aptly reſemble in external figure the ordinary Rhombs of the blue Vitriol of the ſhops, thoſe of this order not leſs reſemble the perfect and regular cryſtals of nitre; theſe Selenitæ have ſix ſides, and two broken ends.

Genus 1. ISCHNAMBLUCES. *Columnar Selenitæ, flatted and octohaedral with broken ends, conſiſting of eight planes, their two broken ends making two of them, and their top and bottom making two planes much broader than the others.*

The Selenitæ of this Genus conſiſt each of ſix ſides, that is, a top and bottom, and four Trapezia; but want the Rhombic ends which make the others decahedral or tetradecahedral; theſe are here cut off, and give two other ſurfaces, the top and bottom of theſe are more depreſs'd, flat and broad than the reſt, and the Trapezia as well as theſe are often ſo nearly equal to one another, that the whole figure comes very near a hexaedral parallellopiped.

Genus 2. ISAMBLUCES. *Columnar Selenitæ, with broken ends, octohaedral but not flatted, the tops and bottoms being no broader planes than the reſt.*

The Selenitæ of this Genus, conſiſt of the ſame number of planes as the former, but have their top and bottom no broader or more depreſs'd than the other planes; but the ſides being all very nearly of the ſame breadth, they reſemble very much the ſprigs of hexangular cryſtal; except in this, that as thoſe terminate regularly in a point, theſe have always their ends broken off.

Genus 3. OXUCIÆ. *Columnar Selenitæ not truncated, but tapering off to a point at each end.*

The Selenitæ of this Genus conſiſt of ſix equal planes as the former, and more than any other reſemble the ſprigs of rock cryſtal; their ends being not abrupt, or as if broken off, as in the two former kinds, but gradually tapering to a point, ſometimes more, and ſometimes leſs perfect.

The ſtructure of theſe three Genera is alike in each, and much reſembles that of the Rhomboidal kinds. Theſe are compos'd, like thoſe, of a number of broad and flat plates, eaſily ſeparating from one another, by ſplitting like the flakes of the foliaceous Talcs: They are like thoſe of the Rhomboidal Genera, compos'd alſo of ſmall filaments, laid evenly and regularly cloſe to one another, but thoſe are in theſe columnar kinds always ſmaller than in the Rhomboidal, and more eaſily ſeparated from one another; ſo that the body more eaſily and readily breaks according to their direction; and they have uſually fewer of the tranſverſe ſtriæ, that in the other kinds ſo frequently interſect theſe, and are often abſolutely without them; whence alſo, the body not only breaks eaſier in this direction, but alſo into more perfect and continu'd filaments.

In theſe Genera, ſome have the filaments running obliquely to the whole planes of the top and bottom, or aſlant acroſs the whole maſs, without interruption; others have them in two directions from the two ſides of the column, and meeting in an obtuſe angle in the middle of the flat planes, or top and bottom of the columns; the three Genera of this diviſion are all equally ſubject to this variation, but the flatted moſt of all.

In thoſe ſpecimens where the filaments run in two directions, and meet in an obtuſe angle, in the middle there is generally ſeen a ſtrait line running longitudinally directly from end

to

to end, this is the place where the filaments meet; ſome ſpecimens have, and others want this, and theſe have the filaments only running all along obliquely acroſs; but the young ſtudent is not to eſteem theſe diſtinct Genera, or even diſtinct ſpecies; many ſpecimens having this longitudinal ſtreak quite thro' their ſubſtance, and as diſtinct on one ſurface as the other, and others having it only thro' one half of the thickneſs of the maſs. It is eaſy to judge hence, that in the firſt ſort, the lines are all double, meeting in an angle, and in the ſecond all ſingle, running each directly acroſs in that part where the longitudinal line is wanting, and double meeting in an angle in that part of the ſpecimen where it is; to this it muſt be added, that there are many found abſolutely without this ſtreak, or longitudinal line; what therefore may either be abſolutely wanting, in part wanting, or perfect, and that in the ſame ſpecimen, can be no character of even a ſpecies, but a mere Luſus naturæ, conſtituting an accidental variety only.

It is uſual for the Selenitæ of all kinds to contain ſmall parcels of Clay: In the Rhomboidal kinds, where there can be no particular determination which way this ſhall be diſpos'd, it is uſually found in irregular ſmall maſſes; but in ſuch ſpecimens of theſe columnar kinds as have this longitudinal ſtreak, which is, in reality, an abſolute crack or flaw, the clay taken up into the ſpecimen, which is ever the ſame with that of the ſtratum in which it lies, and was aſſuredly taken up into it at the time of its original formation, and faſten'd up in it, as the drops of water in cryſtal, the clay taking the courſe directed by this line, in theſe ſpecimens naturally diffuſes itſelf along it, and making its way from its edges in many places a little way into the ſubſtance of the maſs, forms a notch'd or tufted figure, very aptly reſembling the ſpikes of ſome of the graſſes; there are generally two of theſe ſpikes in each column where they are found, with their tops as they appear to be, turn'd the oppoſite way to each other; this is no other than the natural effect of the diffuſion of the clay, and the whole delineation is perfectly analogous to the formation of the Dendritæ in thoſe agates, which we call Moco ſtones. Many have erroneouſly imagin'd this a real vegetable, encloſ'd as the ferns in ſtone; but the ſplitting any one of theſe columns that has it, will ſhew that it is mere clay.

Order the third.

Of this order there is only one known Genus.

INAMBLUCTIÆ. *Selenitæ columnar, abrupt, and of a ſeemingly fibroſe texture.*

The Selenitæ of this Genus conſiſt of ſix equal ſides or planes, and much reſemble the ſprigs of rock cryſtal in their external form; they have their ends not abrupt or broken off, as in many of the columnar kinds, but tapering and pointed, and are not compos'd of flat tables of flakes, but of a number of long parallel filaments, extended thro' the whole length of the body, and as aptly reſembling the Fibrariæ, as the more common kinds of Selenitæ do the foliaceous Talcs.

The orders of theſe bodies are taken from their greater diſtinctions, and are, 1. The Rhomboidal, and 2. The columnar from their determinate figure. 3. The ſtriated from their texture. 4. The tabular from their being merely a plated maſs. 5. The croſs plated from the order of the flakes; and 6. The compoſit from their ſtructure; their Genera are deduc'd from ſubordinate diſtinctions.

Order the fourth.

Of this order there is only one known Genus.

SANIDIA. *Selenitæ tabulated, and reſembling in external figure the foliaceous Talcs.*

The Selenitæ of this claſs are of no determinate form, and conſiſt of no regular planes or angles, but are merely flat, broad and thin plates, compos'd of numbers of other thinner plates, and they of ſtriæ or filaments, diſpos'd obliquely, but in uninterrupted lines acroſs the body; the Selenitæ having been always eſteem'd (when the word was underſtood to expreſs this claſs of bodies) regularly figur'd Foſſils; this Genus has been overlook'd by every body, and the ſpecimens of the different ſpecies of it, look'd on as bodies of a different Claſs, Spars or Talcs. Their not fermenting with Acids, however, determines *them not to be Spars, and their obliquely ſtriated ſtructure determines them to be true and genuine Selenitæ, tho' not regularly ſigur'd. I need not caution the ſtudent in theſe things, not to miſtake the fragments of the other, eſpecially the columnar ſpecies, ſometimes found in thin plates for the ſpecimens of this Genus; the figure of thoſe fragments, as well as their ſtructure, which is ever the finer, and more cloſely ſtriated than in theſe, will alway diſtinguiſh them.*

Order the fifth.

Of this Order alſo there is only one known Genus.

CATHETOLEPES. *Selenitæ octohædral, with perpendicular plates, and obtuſe angles.*

The bodies of this claſs conſiſt in reality ever of eight planes or ſides, and two truncated ends; their top and bottom are more depreſs'd and flatted than the reſt, their ends regularly and evenly ſtruck off, and their Trapezia nearly equal to one another, but the angles they make ſo obtuſe, that the body may eaſily be miſtaken for a hexahedral, one of only four ſides, and two ends.

The ſtructure of theſe bodies is alſo very different from that of all the reſt, tho' their texture is abſolutely the ſame. Theſe are, like the reſt, compos'd of thick plates of flakes made up of vaſt numbers of filaments, running obliquely ſometimes, in continu'd lines the whole length, but oftener making an obtuſe angle, by the meeting of two rows of lines; but theſe plates are not laid horizontally as in all the reſt, but in a perpendicular direction; ſo that the body does not ſplit horizontally, or in a direction parallel to the top and bottom, but perpendicularly to that direction.

Order the ſixth.

Genus 1. LEPASTRA. *Selenitæ, compos'd of filaments arrang'd into broader plates, and diſpos'd in form of a radiated ſtar.*

Genus 2. TRICHESTRA. *Selenitæ, compos'd of filaments, ſcarce viſibly arrang'd into plates, diſpos'd in form of a radiated ſtar, and appearing merely of a ſtriated texture.*

Order the ſeventh.

Of this Order there is only one Genus.

SYMPLEXIA. *Selenitæ, compos'd of various irregular connections.*

The bodies of this Claſs are of an irregular figure, and variouſly notch'd, divided and indented at their edges; they are compos'd of a number of other imperfect Selenitæ, principally of the Rhomboidal kind, tho' not unfrequently with ſome of the columnar, and uſually with parts of the tabular in the maſs. The different bodies that form this kind are ſeldom quite perfect, having uſually fallen together before they were wholly harden'd; but generally whether they form a larger or a ſmaller maſs, affect the external figure of a flat hexaedral column, tho' variouſly notch'd at the ſides, and truncated at the ends.

SERIES III.

CLASS I. ORDER I. GENUS I.

LEPTODECARHOMBES.

1. *Leptodecarhombis pellucidus, ſtriis tenuiſſimis, tranſverſis. Thin, fine, pellucid, ſlender ſtreak'd Leptodecarhombis, with tranſverſe ſtriæ.*

This is one of the moſt uſual and frequent ſpecies of this body, and ſeems alſo one of the moſt pure and perfect kinds.

It is a very elegantly form'd body, conſiſting of a broad and flat top and bottom, but theſe ſeldom exactly of the ſame dimenſions, or evenly anſwering one another; theſe are bounded at their ends, by four pretty regular Rhombs, and at their ſides by as many very nearly equal Trapezia; the rim or ridge that ſurrounds the extent of the body, which is the continu'd edge of its central or largeſt plate, being always very nearly plac'd in the center of the maſs. It is of a very equally and evenly tabulated texture, and very regular ſtructure, the plates it is compos'd of being very regularly diſpos'd, according to their ſize, and making the edges of the body ſmooth and equal; the commiſſures of the ſeveral plates that form them, being ſometimes ſcarce diſtinguiſhable; its ſurface on the top and bottom, or broad horizontal planes, is extreamly ſmooth, even and polite, and very bright and gloſſy, with ſcarce the leaſt appearance of ridges, furrows or ſtriæ; it is very various and uncertain in ſize, ſome ſpecimens having been found of five or ſix inches long, and others not more than one tenth of an inch; but its moſt uſual ſtandard is about an inch and a half in length, and one fourth of an inch in thickneſs. It is compos'd of a great number of fine thin plates of the whole bigneſs of the maſs, if it be ever ſo large, each plate or table being conſtantly of one piece; theſe are laid extreamly cloſe on one another, and join very equally and regularly together, and are themſelves compos'd of a vaſt number of long ſlender filaments, which are arrang'd cloſely ſide by ſide, in a beautiful order, and running ſomewhat obliquely from one ſide to the other acroſs the maſs, from the ſubſtance of each plate or flake; and in this ſpecies have no other lines or ſtreaks interſecting them. Theſe flakes very readily ſeparate from one another in an horizontal direction, or parallel to their diſpoſition with very little force, the maſs being nearly as fiſſile as Talc; they will alſo part evenly and regularly, according to the oblique tranſverſe direction of the filaments, but this with more difficulty; the plates horizontally ſeparated, are a little flexile, but not at all elaſtic, but very apt to ſeparate at the commiſſures of the filaments in bending; they are of extream brightneſs where freſh broken, and in the rude maſs are gloſſy enough, and very beautifully tranſparent. It is but of a moderate degree of hardneſs, the flat ſurfaces of the plates may be ſcratch'd like a piece of chalk with one's nail, but the commiſſures of them in the Rhombs and Trapezia are not quite ſo eaſily mark'd; it is naturally, and when pure, perfectly colourleſs as cryſtal; but is very frequently found ſtain'd, obſcur'd and blotch'd with ſmall pieces of clay, which are lodg'd ſometimes near the ſurface, ſometimes deeper, and are ever of the ſame colour with the clay of the ſtratum in which it is found lodg'd; it is conſiderably heavy.

It will not at all give fire with ſteel, nor ferment with Aqua Fortis, and pretty readily calcines to a pure opake white.

Examin'd by the Microſcope it appears extreamly bright and pellucid, and compos'd of the moſt beautiful and regular arrangements imaginable of ſlender filaments. It is to be obſerv'd, however, that in this and ſome other, eſpecially of the finer ſpecies, this ſtructure is not obſervable in the ordinary maſſes, or in their perfect ſtate; but in many of them, and very frequently in this particular kind, the foulneſſes occaſion'd by clay, point out the direction of theſe filaments, and make them viſible in others; it is neceſſary to cruſh and injure them by bending, which in ſome meaſure ſeparating the filaments from one another, makes them very diſtinctly viſible, and ſhews the whole to be a ſort of fine congeries of a Fibraria.

There are no bodies in the whole Foſſil kingdom ſubject to more, or more elegant varieties than the Selenitæ; this ſpecies, as well as the reſt, is frequently found with other ſmaller Selenitæ, of its own ſhape, and of the ſame ſpecies immers'd in part, and ſometimes wholly in it; theſe ſmaller ones are perfect, and not at all cruſh'd or alter'd in their form, and the ſubſtance of this ſpecies being very pellucid, ſhews them very beautifully wherever immers'd; ſometimes alſo pieces of the common Vitriolic Pyrites, are wholly, or in part, immers'd in the ſame manner in it, and ſometimes, tho' more rarely, ſpecimens of other ſpecies of the Selenitæ.

It is found in conſiderable quantities, and lodg'd at different depths in the ſtrata of Clay in moſt parts of England; a ſtratum of dark blue Clay that covers thoſe of ſtone in Heddington quarry in Oxfordſhire has long been famous for it, and in Leiceſterſhire, Northamptonſhire, Yorkſhire and many other counties, ſcarce a tile clay pit can be opened, or a well dug but it is found.

Its formation has been very evidently in the once univerſal fluid; ſince it is plain, that at the time when it was form'd, the very earthy matter in which it was to be depoſited, was alſo ſuſpended in that fluid, and has frequently been taken up into it: Its origin is plainly analogous to that of ſalts cryſtallizing after having been diſſolv'd in water; theſe we find, tho' we cannot well explain why, ever on the abſence of a certain quantity of the fluid in which they were once ſuſpended, coaleſcing into the ſame determinate figures, if not prevented by accidents; and ſo have theſe bodies alſo evidently done, ſometimes more perfectly where leſs diſturb'd, ſometimes, where more liable to accidents, more irregularly.

It has been too general an error, to imagine theſe and all the other figur'd Foſſils, to owe their origin to ſalts, becauſe they are like thoſe ſubſtances, always found concreted into regular figures; but ſince theſe and the other regularly figur'd Foſſil bodies do not appear to contain any ſalts, ſurely it is much more reaſonable to imagine, that this quality of concreting into regular figures after ſolution, is not peculiar to ſalts, but is a property of many other bodies very different from thoſe; ſince the ſame power that gave this regular direction to the particles of the one, was equally capable of giving it to others; and I am apt to believe, that whenever we ſhall be able to diſcover, why ſalts are ever found of themſelves cryſtallizing into thoſe forms, we ſhall find that theſe have alſo the ſame properties communicated to them, and that in the ſame degree and manner, tho' abſolutely different bodies.

2. *Leptodecarhombis hebes & opacus, ſtriis tenuiſſimis, tranſverſis.*
Thin, dull-looking, opake, ſlender-ſtreak'd Leptodecarhombis.

This is a ſpecies of much leſs beauty than the former, but much firmer, ſtronger and harder. It is ever a regularly and perfectly form'd body, and conſiſts, like the former, of a top and bottom, four Rhombs at its ends, and as many Trapezia at its ſides, giving on the whole ten planes; the top and bottom, and other correſpondent planes, come nearer, being of the ſame dimenſions with one another in this ſpecies, and of conſtituting a regular parallelipiped than in any other; but even in this they never have a perfect exactneſs. The ridge or rim that ſurrounds the whole body, and divides the Rhombs and Trapezia, is in this never plac'd exactly in the middle, and conſequently, tho' the correſpondent planes every where nearly anſwer, the two Rhombs and Trapezia on the ſame ſide of the body, are ever of different breadth. The whole maſs is of a very beautiful and regular tabulated ſtructure, the plates rang'd with that equality at their edges, that the ſides and ends of the maſs are nearly as equal and ſmooth as the top or bottom, and don't carry the leaſt mark of their commiſſures: The ſurface of the horizontal planes is tolerably ſmooth, but much leſs bright or gloſſy than that of moſt of the other kinds, and is not viſibly either ridg'd, ſtriated or mark'd with any other lines. The ſize of this ſpecies is very uncertain, I have ſeen of it from half an inch, to three inches in length; its uſual ſtandard is under an inch, and it is, of whatever ſize, always thinner in proportion than the former, one of an inch long ſeldom exceeding one eighth of an inch in thickneſs. It is compos'd as the reſt of theſe bodies are, of a great number of even flat plates or flakes, each of the whole ſize of the horizontal ſurface of the maſs; theſe are laid very evenly and regularly on one another, and are ſo regular in ſize, according to the ſize of the parts of the maſs, as to make, with the commiſſures of their edges, as fair and ſmooth a ſurface, as that of the flat ſides of them on the horizontal planes; theſe plates are compos'd of a multitude of parallel filaments, of extream fineneſs, and very beautifully arrang'd obliquely acroſs the body; they are not eaſily diſtinguiſhable in the body at firſt ſight, but if a plate be ſeparated from the reſt, and a little bent, they are then diſtinguiſh'd very plainly, and have ever four or five, ſeldom more, longitudinal lines running alſo obliquely thro' the maſs, and interſecting them throughout; theſe laſt are more readily viſible than the tranſverſe, and ſhew themſeves on the leaſt bending of the plates. The plates of this maſs are fiſſile to a great degree, and will break regularly alſo, either according to the tranſverſe or longitudinal lines, but that not ſo eaſily; the flakes of this are moderately flexile, but not at all elaſtic, naturally remaining bent, when once made ſo; they have the leaſt brightneſs alſo, and moſt obſcure tranſparence of almoſt any ſpecies of this body, but they are harder than moſt others, and not ſo eaſily ſcratch'd; they are not ſo perfectly colourleſs as the former, but have evidently ſomewhat of a duſky whitiſh brown in them; they are conſiderably heavy.

It will not give fire with ſteel, nor ferment with Aqua Fortis, and calcines more ſlowly in the fire than the former kind.

Examin'd by the Microſcope it appears ſomewhat opake, and irregularly cloudy, and ſeems, indeed, very evidently to be foul'd by a ſmall quantity of earth, equally diffus'd thro' it, and entering the very texture of the fibres which compoſe the plates.

From the want of pellucidity in the flakes, and their general appearance in this ſpecies, it may be a very natural error to ſuppoſe Spar to be incorporated with it; and Dr. Woodward mentions a Selenites, whether of this kind or not, his imperfect account of it will not ſuffer us to judge, in which he imagines there is Spar incorporated; but the general teſts of Foſſils evince, that this contains none, ſince, if it did, it muſt ferment with Aqua Fortis, and calcine the more, not the leſs readily in the fire.

Beſide the general cloudineſs of this ſpecies evidently occaſion'd by a ſmall, but perfectly diffus'd parcel of earthy matter; it is almoſt always found foul'd with ſtains and blemiſhes of abſolutely plain clay, the ſame with that of the ſtratum it lies in, lodg'd in ſeparate maſſes in different parts of it.

It is a more ſcarce ſpecies than the former; I do not remember to have met with it more than twice, once near Loughborough in Leiceſterſhire, the other time in the potter's clay pits in Staffordſhire.

3. *Leptodecarhombis ſtriis tenuibus, longitudinalibus:*
Thin, fine ſtreak'd Leptodecarhombis, with longitudinal ſtriæ.

This is a very elegant ſpecies, and little inferior to the firſt deſcrib'd, in brightneſs or tranſparence. It is a perfect and regularly figur'd body, conſiſting of two horizontal planes, which I call a top and bottom, four Rhombs, or ſhorter planes at its ends, and four Trapezia, or longer at its ſides; the limb or ridge that ſurrounds it in its greateſt extent, is ever nearly in the center of the body, and conſequently the Rhombs and Trapezia are of equal breadths one with another; it is uſually thin in proportion to its ſize, and long in regard to its breadth; its oppoſite plane ſurfaces, or top and bottom, are uſually much of the ſame breadth and length, and pretty evenly plac'd over one another; it is of an extreamly pure ſubſtance, and very regular ſtructure; the plates it is compos'd of ſeeming very evenly laid on one another, and much of the ſame thickneſs, but being not very exactly rang'd according to their ſize: tho' their commiſſures are very firm and nicely join'd, their edges ſometimes hang a little over one another, and make the planes of the Rhombs and Trapezia leſs ſmooth than in either of the former ſpecies, and ſomewhat ridg'd and furrow'd; the number and ſtructure of the plates is beautifully diſtinguiſhable here. The body is of various ſize, but uſually is but ſmall; an inch or little leſs, being its moſt frequent ſtandard, and about one ſeventh of an inch its common thickneſs in that ſize. It is compos'd, like the reſt, of parallel horizontal flakes or tabular plates, but differs very eſſentially from the before deſcrib'd, in the diſpoſition of the filaments which compoſe thoſe plates, which are very fine, ſtrait and ſlender, and laid with a beautiful regularity cloſely and evenly by one another, and run in an oblique longitudinal direction, from the one end of the ſtone to the other; the arrangement and direction of theſe is beautifully ſeen in a moderately thick flake ſeparated from the reſt, and ſlightly bent to diſunite them a little; and they have never the leaſt mark of any tranſverſe ſtriæ to interſect them; the whole maſs is eaſily fiſſile in an horizontal direction, and parts into flakes like Talc; and theſe if not too thick, beautifully and evenly break again perpendicularly according to the direction of their component filaments; they are moderately flexile but not at all elaſtic, and the whole maſs has a very beautiful brightneſs, and conſiderable tranſparence; it is very ſoft, and eaſily ſcratch'd on the horizontal planes; and is, when pure, perfectly colourleſs as water; it is conſiderably heavy.

It will not at all ferment with Aqua Fortis, nor give fire with ſteel.

It burns to a fine white, calcining very readily and quickly.

Examin'd by the Microſcope, its plates appear more elegantly arrang'd than in almoſt any of the others, and its ſtriæ all perfect and even, and not diſtinguiſhable from thoſe of a fine Fibraria.

It is found in plenty at the tile clay-pit at Richmond, but generally at conſiderable depths; it is leſs frequently foul'd with clay than moſt other ſpecies, and is with ſome of the others, ſubject to one elegant variety; that is, to have on its top and bottom four lines at equal diſtances from the margin, deſcribing a ſmaller Rhomboid upon it, perfectly and exactly of its own ſhape.

4. *Leptodecarhombis, ſuperficie ſcabra, ſtriis tranſverſis, craſſioribus. Leptodecarhombis, with thick, tranſverſe ſtriæ, and a ſcabrous ſurface.*

This is a very ſingular ſpecies, tho' the coarſeſt and of the moſt rude and irregular ſtructure of any of this Genus; it is generally an imperfectly conſtructed body, but always conſiſting like the reſt of a top and bottom, four Rhombs, and four Trapezia; the limb or ridge that makes the extent of the body, and parts theſe, is uſually far from the middle of the body; and conſequently the planes on the ſides and ends are of irregular breadths; one of the Rhombs at each end, and one of the Trapezia at each ſide, being conſtantly much narrower than the other on the ſame end or ſide; it it is generally long in proportion to its breadth, and ever proportionably thicker than any of the former ſpecies; it is the moſt irregularly tabulated of any ſpecies of this Genus, its ſeveral plates being by no means equal either in length, breadth, or thickneſs, but ever compos'd of ſmaller irregularly put together, and thoſe unequal and abrupt in many places; it is eaſy to conceive from the nature and arrangement of theſe, that the ſurface of this ſpecies muſt neceſſarily be more ſcabrous and unequal than in any of the former; the top and bottom are indeed much ſo, each viſibly made not of one equal plate, but of parts of many irregularly falling over one another, and compoſing what may be call'd one thick and coarſe one; but their irregularity at their edges, make the ends and ſides of the body, or the Rhombs and Trapezia, of a very unequal ſurface, theſe being compos'd of the edges of the plates prominent in different degrees, and making a more ridg'd and furrow'd ſurface than is ſeen in any of the before deſcrib'd ſpecies; it is of various ſizes, but frequently large, about an inch and half is its moſt uſual ſtandard, but it is found of all the ſizes between one tenth of an inch, and ſix inches; and the plates or flakes which compoſe it are not leſs remarkable for the largeneſs of the filaments that compoſe them, than for the irregular diſpoſition of the congeries of them, which together make up the ſingle tables: the filaments which compoſe theſe, are broad, large and coarſe, and run obliquely acroſs the plates, or parts of plates which they compoſe, without any longitudinal ſtriæ to croſs them; the whole maſs is fiſſile with great eaſe, and according to the thickneſs of the plate to be ſeparated, and the ſize and number of the partial ſcales which make it, either falls off whole or in ſeveral oblong fragments; many of the plates, eſpecially thoſe in the inner part of the maſs, ſeem on a ſlight view as equal, and as much ſingle flakes as in the other; but if a little bent, theſe throw off a number of theſe ſmall or partial flakes, and ſhew, that it is the remarkable character of the ſpecies to be compos'd in this manner; the flakes of this ſpecies are more flexile than thoſe of almoſt any other, they are the very coarſeſt in their ſtructure of thoſe of any ſpecies, yet conſiderably bright and pellucid, and are alſo ſofter and more eaſily ſcratch'd on their flat ſurfaces than thoſe of any other; they are naturally perfectly colourleſs, but are found often ting'd and obſcur'd by ſmall parcels of Clay, which their coarſer ſtructure makes them more ſubject to receive into the commiſſures of their plates than any other kind.

It is conſiderably heavy, and will not at all give fire with ſteel, or ferment with Aqua Fortis.

It very quickly and readily calcines to a perfect whiteneſs.

Examin'd by the Microſcope, it appears in every plate a congeries of very beautiful and regularly arrang'd filaments: the coarſeneſs of the ſtructure and largeneſs of the filaments in this ſpecies makes the ſtructure of theſe bodies very diſtinguiſhable; the filaments are all perfectly ſmooth and even on their ſurfaces, and arrang'd together with the moſt perfect regularity, but very eaſily diſplac'd by bending the plate; and then, inſtead of the natural tranſparence of the body, they render'd thoſe parts of it in which they have been diſturb'd, white and opake; theſe filaments are ranged together, as we perceive alſo by this ſpecies, not in one continued body, but in ſeveral faſciæ, conſiſting of from twenty to an hundred or more in each; and it is common, in viewing the body when bent, to find it vein'd as it were acroſs with cryſtalline and ſnow white veins; which is owing to ſome of theſe faſciæ of filaments being left undiſturb'd, while others are perfectly diſcompos'd; the ſmall flakes appear alſo here to be evidently and really diſtinct from the reſt of the flakes they lie upon; ſince it is common to ſee them perfectly unhurt, and remaining pellucid, while the under plate has ſome of its faſciæ diſturb'd, and running in oblique but continued lines under them.

This is a very common ſpecies in Yorkſhire and Leiceſterſhire.

5. *Leptodecarhombis brevior, ſquammis craſſioribus.*
Short Leptodecarhombis, with thick plates.

This is a ſpecies, tho' much reſembling the firſt deſcrib'd on a ſlight view, yet moſt ſpecifically diſtinct both from it, and all the other kinds; it is like the reſt, a perfect and regularly form'd body, conſiſting of a top and bottom, four Rhombs, and as many Trapezia; the ridge or rim that makes the extent of the maſs, is ever placed very regularly in the middle of the body, and conſequently the Rhombs are of equal bigneſs with one another, as are alſo the Trapezia; the horizontal planes are conſiderably broad and nearly parallel to one another, and the whole body ever very broad in proportion to its length, and conſequently its Rhombs and Trapezia, or ends and ſides, make planes of nearly equal extent; it is very evenly tabulated, its plates being cloſely join'd, and nearly equal in ſize, and its ſides and ends form ſurfaces almoſt as ſmooth as its horizontal planes: Its top and bottom are extreamly ſmooth and even, and not at all mark'd with ridges or furrows, or with fragments of plates, or indeed with any viſible lines; it is of various ſizes as the reſt, but about two inches in diameter is its moſt uſual ſtandard; it is compos'd of a ſmaller number of plates than moſt of the other ſpecies, and thoſe conſiderably thick; and when a little cruſh'd or bent, is manifeſtly ſeen to be compos'd of a number of very large and thick ſtriæ, diſpos'd in faſciæ, or bundles as in the other kinds, but all running longitudinally, not tranſverſely thro' the body; and interſected by four or five ſingle tranſverſe ſtreaks: This ſpecies is very readily fiſſile, but that not into thin plates, and will freely enough break alſo regularly in a longitudinal direction according to the range of the fibres; the tranſverſe ſtriæ never preventing its breaking regularly along, or giving the faſciæ of filaments in their natural length: The plates are moderately flexile but not at all elaſtic, and the whole maſs conſiderably bright and very beautifully tranſparent; it is not ſo ſoft or eaſily ſcratch'd as ſome of the others; and when pure, is perfectly colourleſs as water, but it is liable to be foul'd or ſtain'd by admixtures of ſmall quantities of earth. It is moderately heavy.

It will neither give fire with ſteel, nor ferment with Aqua Fortis.

It burns pretty eaſily to an opake white.

Examin'd by the Microſcope, the plates tho' thick, appear abſolutely ſingle, and compos'd of faſciæ of filaments very large and coarſe; and tho' very pellucid naturally, it becomes the moſt opake of any ſpecies I know of when cruſh'd or bent too far.

It is very common in the clay-pits of Northamptonſhire and Yorkſhire; it is ſubject to various foulneſſes from clay admixt into it at its formation, and like ſome of the others, has frequently a ſmaller Rhomboide mark'd out on its top and bottom, by white and opake lines; and has frequently ſmaller bodies of its own kind immers'd in part in its ſubſtance.

SERIES

SERIES III.

ORDER I. CLASS I. GENUS II.

PACHODECARHOMBES.

1. *Pachodecarhombis pellucidus, ſtriis tenuibus, tranſverſis.*
The more pellucid Pachodecarhombis, with ſlender, tranſverſe ſtriæ.

This is a very beautiful and regularly form'd body, but from its thickneſs and length, which is always very conſiderable in proportion to its breadth, is apt to miſlead people at firſt ſight to judge it a Columnar not a Rhomboidal kind; it is compos'd of a top and bottom, four Rhombs, and as many Trapezia; its limb or ridge, ſurrounding its greateſt extent, is never nearly in its middle, but conſiderably nearer to the one or the other of its horizonal planes; it is very remarkably long for its breadth, and is not leſs obſervable for its thickneſs; a ſpecimen of it of two inches long, being often not more than three quarters of an inch broad, and of an inch and half in thickneſs; it is generally but irregularly tabulated; the plates of which it is compos'd being often of very different thickneſſes, ſome from others, and very frequently forming cluſters or compound plates, each made of ſix or eight, and often many more of the ſingle flakes united, and ſeeming one thicker ſingle plate on a ſlight view of the maſs; they are alſo ſometimes crack'd or diſcontinued in the body, but this more rarely; whatever may be their irregularities in theſe reſpects, they are, however, ſo evenly ranged in regard to ſize, or extent, that the planes their extremities form, that is, the Rhombs and Trapezia, are uſually nearly as ſmooth and even in ſurface as the horizontal ones made by their flat ſurfaces; theſe laſt are uſually very gloſſy and polite: This ſpecies is very various in ſize, but is uſually found large; between two and three inches being its moſt ordinary length, tho' there are found of it at times from one tenth of an inch to eight inches, according to the report of the people who dig in the pits where it is found.

It is compos'd of horizontal plates very numerous, and not only very irregularly diſpos'd into ſmaller congeries in the larger, but of really very different thickneſſes one from another; while ſingle, theſe plates are very bright and pellucid, and are compos'd of moderately fine, parallel, ſtrait filaments, running obliquely acroſs their whole ſubſtance from ſide to ſide, and not interſected by any longitudinal lines; the maſs is very fiſſile, and readily parts horizontally into a number of thin flakes, much reſembling thoſe of the foliaceous Talcs; it will not in the maſs eaſily be broken thro' with any degree of regularity, according to the direction of the filaments that compoſe theſe plates; but when they are ſingle, it with great eaſe breaks tranſverſely and that regularly according to them; the flakes are very flexile but not at all elaſtic, tho' otherwiſe approaching to the nature of the Talcs; the whole body is bright and very pellucid, but ſo ſoft as to be very eaſily ſcratch'd on the horizontal ſurfaces; and is naturally perfectly colourleſs, but is ſubject to tinges from admixture of earth; it is conſiderably heavy.

It will not give fire with ſteel, nor ferment with Acids, but pretty freely calcines to a fine ſnow white.

Examin'd by the Microſcope after bending, it ſhews itſelf to conſiſt of filaments ſo well join'd together, that they are much more difficultly ſeparated and disjoin'd than thoſe of moſt other ſpecies; the greateſt part of any flake of it remaining unalter'd, after as much bending as would have deſtroy'd the whole texture of a flake of the common kinds, and the bundles of filaments appearing in a few places only diſturb'd and made viſible.

It is frequent in the Clay-pits of Northamptonſhire, and ſome other counties, and generally lies at conſiderable depths; the ordinary people have an opinion of its being good to ſtop Hæmorrhages of all kinds, and call it Stanch.

It is very ſubject to be ſtained, ſpotted and clouded with ſmall quantities of Clay, and to have ſmaller bodies of its own kind, ſometimes four or five together immers'd in its ſubſtance, and ſeeming to grow out of it.

2. *Pachodecarhombis hebes, ſtriis tranſverſis, tenuiſſimis.* *The thicker, dull-looking Pachodecarhombis, with very fine tranſverſe filaments.*

This tho' of leſs brightneſs and tranſparence than the former, is a very elegant and regularly form'd body; it is compos'd of two horizontal and eight lateral planes as the reſt, and the rim or ridge ſurrounding the extent of the body, and dividing the Rhombs and Trapezia from one another, is ever very prominent and obſervable, but is placed ſo obliquely in the maſs, that the Rhombs and Trapezia are each pair of them of very different breadths; it is ever conſiderably long in proportion to its breadth, and always very thick, the larger of the Rhombs or Trapezia often making a plane of equal extent with the horizontal ones which are its top and bottom; it is very equally and evenly tabulated, and of an extreamly regular ſtructure, and the plates ſo nicely ranged in regard to ſize, that the ſurfaces of the lateral planes are uſually as ſmooth as the horizontal ones, and the Rhombs as gloſſy; the Trapezia in this ſpecies, and indeed more or leſs in all the others which have their filaments running tranſverſely or acroſs the body, are much rougher than theſe; and may, if attentively examin'd, be ever diſtinguiſh'd by this difference of their ſurface in thoſe ſpecies, which are ſo broad in proportion to their length, as to make it not eaſily determin'd at firſt ſight which are its ends and which its ſides, or which one and which the other of theſe lateral ſurfaces: the top and bottom in this ſpecies are of a very ſmooth but little gloſſy ſurface in compariſon with many others, tho' not mark'd with any conſiderable furrows, or large ſtriæ; it is one of the larger ſpecies, but uſually ſomething ſmaller than the former, its moſt frequent ſize being ſomething leſs than two inches in length; it is compos'd of a very regular arrangement of extreamly fine and thin plates, not collected any where into bundles or congeries, but evenly diſpos'd throughout the maſs; theſe are made up of tranſverſe filaments extreamly ſmall, fine and ſlender, all running tranſverſely in an oblique direction thro' the ſurfaces of the ſtone, or whole ſubſtance of each plate, each being compos'd of a ſingle arrangement of them, and their diameter when ſingle making the thickneſs of the plate; they are ſometimes croſs'd by a ſmall number of longitudinal ſtreaks or lines, but are oftner found to want them; the body is fiſſile in an horizontal direction, into a great number of flakes reſembling thoſe of the foliaceous Talcs, which are the plates that compoſe it; they do not ſeparate ſo eaſily, however, as thoſe of many other ſpecies in this direction, but break tranſverſely, or according to the filaments, more equally and eaſily than moſt others; the flakes when ſeparated have ſomething of a foulneſs not common in theſe bodies, and look remarkably dull, tho' not without ſomewhat of the natural gloſs of theſe bodies, and are leſs flexile than moſt, uſually breaking with a very ſmall force, and are not at all elaſtic; the whole maſs has but a duſky and imperfect degree of tranſparence; it is ſoft enough to be eaſily ſcratch'd on the flat ſurfaces by ones finger nail, and is conſiderably heavy.

It will not give fire with ſteel, nor at all ferment with Aqua Fortis.

It more ſlowly than moſt others, calcines to an imperfect, or greyiſh white.

Examin'd by the Microſcope, its filaments are ſeen to be very eaſily diſcompos'd, and ſeparated by bending, and not to be ſo regularly collected into faſciæ, or ſmall congeries, as in moſt of the other ſpecies; but nearly evenly continued on thro' the whole plates; it has leſs brightneſs than many others in this examination, and appears manifeſtly foul'd with earth taken up into it in its original concretion.

It is found in the clay-pits of Northamptonſhire, Staffordſhire, Yorkſhire, and moſt other counties: but this, and indeed all the larger ſpecies are not common in the clay-pits about London.

This is ſubject to the ſame varieties with the reſt, and tho' naturally a very regularly conſtructed ſpecies, yet is ſometimes found with a very unequal ſurface, full of ſmaller and larger cavities from the filaments that compoſe the upper plates, ending abruptly before they reach the edge on the oppoſite ſide.

3. *Pachodecarhombis, ſtriis tenuibus, longitudinalibus.*
Pachodecarhombis, with fine longitudinal filaments.

This is as elegant and regular a body as any one of this claſs; it is compos'd like the reſt, of two horizontal and eight oblique planes, and has its ridge marking its extent as exactly as in any ſpecies in the center of the maſs; it is long and thick in proportion to its breadth, and its Rhombs and Trapezia are very unequal in ſize, and are indeed in this ſpecies not to be diſtinguiſh'd but by this, ſince their ſeveral ſurfaces would be apt to lead a young ſtudent into error and confuſion; I have before obſerv'd, that all the ſpecies of the Selenitæ, which have their filaments diſpos'd tranſverſely, have the ſurfaces of their Trapezia rough, cavernous and unequal; whereas thoſe of their Rhombs are (provided the plates compoſing the body are evenly diſpos'd, as is uſually the caſe, and do not hang over one another at their edges) ever plain and ſmooth, and nearly as gloſſy as the horizontal planes: the reaſon of this is plainly, that the longitudinal edges of the filaments are naturally more equal than their ends; or in other words, their breadth is more certain and determinate than their length; the conſequence of this being, that the ſurfaces made by the ends of theſe filaments muſt be rougher and more unequal than thoſe made by their ſides; the Trapezia of thoſe ſpecies, which have the filaments diſpos'd tranſverſely, muſt be rough, and their Rhombs ſmooth; but, on the contrary, in theſe ſpecies where the filaments run longitudinally, the contrary muſt be the caſe; and the Rhombs, as their ſurfaces are made of the ends of the filaments, muſt be the rougher ſurfaces; and the Trapezia, which are here made of the ſides of the ſame filaments, muſt, on the contrary, be ſmooth and gloſſy; and thus we find it on examination in all the Selenitæ whoſe filaments run longitudinally.

This is very evenly and regularly tabulated, and its plates ſo equal in ſize and proportion, that the lateral ſurfaces compos'd of their edges, that is, in this inſtance, the Trapezia are very nearly as ſmooth, polite and gloſſy as the horizontal planes; the faces of the Rhombs are, indeed, from the filaments which compoſe the plates, ſometimes terminating abruptly before they reach them, often ſomewhat irregular and cavernous; the horizontal planes are very bright and gloſſy, but not without ſome appearance of ſtreaks and furrows, the filaments which compoſe the plates being more viſible in this than in almoſt any of the ſpecies; it is of various ſizes, from one fourth of an inch, to three inches in length; beyond this ſize I never have ſeen it, and moſt uſually it is of about an inch; it is compos'd of a great number of very fine and thin plates, and thoſe of an almoſt infinite multitude of moderately fine longitudinal fibres, or filaments, arrang'd in a very regular and beautiful order, and viſibly, even to the naked eye, collected into ſeparate congeries, a ſmall faſciæ, but no where croſs'd by any tranſverſe ſtreaks; it eaſily ſplits horizontally into its component plates, and thoſe of great thinneſs, but does not ſo eaſily divide according to the arrangement of the fibres, as ſome other kinds, perhaps becauſe they are more firmly join'd in the maſs; the plates are very little flexile, but not at all elaſtic; the fibres more eaſy ſeparating on the force apply'd in bending the plates in many of the ſpecies, ſeem the moſt probable and rational account for their want of theſe qualities: It is very bright and beautifully tranſparent, perfectly colourleſs when pure, but ſubject to the ſame foulneſſes as the other ſpecies; it is very eaſily ſcratch'd on the ſurfaces of the plates, tho' much more difficultly at their edges; and is conſiderably heavy.

It will neither give fire with ſteel, nor ferment with Aqua Fortis.

It calcines more readily than moſt into a fine ſnow white ſubſtance.

Examin'd by the Microſcope, it ſhews, after bending the plates and diſturbing the order of the filaments, the ſtructure of itſelf and all the reſt of the longitudinally ſtreak'd Selenitæ very beautifully; the filaments are collected into faſciæ, and theſe much much more eaſily ſeparate from one another than the ſeveral filaments that compoſe them, and are often the whole faſcia, and often only a part of it, or a ſmall number of the filaments wanting toward the ſurface, and make a cavern or cavity proportionable to ſuch part of them as are wanting in it.

It is a very common ſpecies in Yorkſhire, but is leſs frequent in other counties; it is there not only found at various depths in digging, but frequently lies on the ſurface of the earth on the tops of their higheſt hills.

4. *Pachodecarhombis pellucidus, fuſcus.*
The brown, pellucid Pachodecarhombis.

This is a very ſingular and very elegant ſpecies; it is frequent with many, indeed with almoſt all the other ſpecies, to be occaſionally ting'd with earth; but they then become opake, dull, and duſky in proportion; this, on the contrary, is never found without its colour, nor ever has it in any very different degree, and is clearer and more pellucid than any other kind, and of a much cloſer ſtructure than the fineſt of the reſt. It is a very regularly form'd body, and conſiſts, like the reſt of this Genus, of two horizontal, and eight lateral planes, or a top and bottom, and eight ſides, very evenly divided from one another, by a prominent rim or ridge running thro' very nearly the center of the body. It is always ſhort and thick, in proportion to its length, very evenly tabulated, and the plates ſo regularly diſpos'd, according to their ſizes, that the ſurfaces made by their ſides, which in this, as in moſt other ſpecies are the Rhombs, are nearly equal to the horizontal planes in ſmoothneſs: the Trapezia are ſomewhat more irregular and rough, tho' not ſo much ſo as in moſt other kinds; the top and bottom are perfectly ſmooth as cryſtal, and not leſs bright and gloſſy, the body carrying on them not the leaſt mark of its texture, but looking like a ſimple plane of cryſtal, or leaf of Talc, without the leaſt ſign of any ſtreak, ridge or furrow. It is uſually found conſiderably large, three inches being its moſt frequent and ordinary length, tho' it is at times found much ſmaller; it is compos'd of a vaſt number of fine, pellucid and firm parallel plates, laid perfectly evenly on, and join'd very exactly to one another, and ſeldom exhibiting the leaſt flaw thro' the whole ſubſtance of the maſs; theſe, while they are uninjur'd, ſhew not the leaſt ſign of their being of the Selenites conſtitution, but when ſufficiently bent, the filaments they are compos'd of ſtart from one another, and make the whole white and opake. It is uſual with the flakes of the other ſpecies, when thus ſhatter'd in their texture, to be white and opake in ſome parts, while they remain pellucid in others; this, I have before obſerv'd, is owing to the force in bending, having ſeparated ſome and not others, of the faſciæ of filaments of which thoſe plates are compos'd; that, however, is not the caſe here, for this ſpecies having its plates conſiſting of a number of filaments, all arrang'd in the ſame order, and none collected into ſeparate bundles, is uſually injur'd in all parts where the force preſſes equally alike, and becomes a continu'd white and opake body, not a ſtreak'd or ſtrip'd one, part white, and part pellucid, as they do; the filaments in this all run tranſverſely in an oblique direction, and are interrupted by no longitudinal ſtreaks. The maſs is very fiſſile, and parts the moſt readily into its horizontal plates, and thoſe the thinneſt of any ſpecies; it will alſo, in plates not too thick, break tranſverſely, according to the ſite of the filaments, but not ſo eaſily. It is eaſy to conceive, from the fine ſtructure of this ſpecies, that its flakes are the moſt flexile of thoſe of any Selenites, they are at leaſt equal to any in this particular, and much approach to the Muſcovy Talc. They are abundantly the moſt bright, and the whole body the moſt tranſparent of any of this Genus, it being as eaſy to read the letters of a ſmall print thro' a ſpecimen of it of two inches thickneſs, as thro' a plate of the thinneſt glaſs. It is of a more compact ſtructure, and conſequently not ſo eaſily ſcratch'd as the ordinary kinds. Its colour is exactly that of the fineſt brown cryſtal, and it ſeems very evidently not to have received it from an admixture of earth, but from the ſame principle with that body; it is conſiderably heavy, but like the reſt, will not at all ſtrike fire with ſteel, nor ferment with Aqua Fortis; whence it is evident, that it contains no cryſtal, nor Spar in it, but is as pure and genuine a Selenites as any of the reſt, only more perfect; and like the reſt, it pretty freely and readily calcines to a fine white.

Examin'd by the Microſcope, even with the moſt powerful magnifiers, it will not at all diſcover its ſtructure, till the filaments are diſplac'd by bending it, then it ſhews them arrang'd in the moſt even and regular manner imaginable.

It is found very frequently in Germany, and ſometimes in England; I remember to have ſeen it on Mendip Hills in Somerſetſhire, at conſiderable depths, but don't know of it in any other part of England; and there in no great plenty.

It is liable to the ſame accidents with the reſt, and often is ſeen making a very beautiful figure with three or four ſmaller ones, in part immers'd into it; and as it is ſo very pellucid, the ends of them that are within its ſubſtance, are ſeen as perfectly gur'd as thoſe without. It is very evident from this, and other ſuch obſervations in the more ordinary ſpecies, that theſe ſmall ones were perfectly concreted before the larger began to form themſelves about them.

SERIES III.

CLASS I. ORDER I. GENUS III.

TETRADECARHOMBES.

1. *Tetradecarhombis tenuior & pellucidus, ſtriis tranſverſis.* *The thinner, more pellucid Tetradecarhombis, with tranſverſe filaments.*

THIS is a very elegant and beautiful ſpecies; it is, as are alſo all the other of this Genus, much of the external form and figure of the others before deſcribed, but this has eight Rhombs, inſtead of four; each Rhomb being longitudinally divided into two; theſe are conſequently longer and narrower than thoſe of the other Genera can be, and are leſs properly Rhombs in figure; but as the planes in this part of the body of the other Selenitæ, have been hitherto expreſs'd by this word, the reader will pardon my avoiding a multiplicity of terms, by calling theſe planes by the ſame general name, tho' leſs properly of that figure: theſe, with the four Trapezia which are not divided into two, as theſe are, and the two horizontal planes, make together fourteen planes; of which number, this body, and the others of the Genus ever conſiſt: It is only the edges, and not the ends of the plates of this and the other ſpecies that are liable to this ſecond diviſion, and conſequently, as the Rhombs only are thus divided, no ſpecies of this Genus can have the filaments longitudinal; the limb or ridge ſurrounding this, is ever nearly in the middle of it, and conſequently all the correſpondent planes nearly of the ſame diameter. It is uſually very thin in proportion to its length and breadth, but is uncertain in this, ſometimes being much more, ſometimes much leſs ſo: Its breadth bears much the ſame proportion to its length, as that of the ordinary thinner Decahedral kind. It is very regularly and evenly tabulated; its Rhombs are of very ſmooth ſurfaces, and its Trapezia more even than thoſe of many other kinds; its top and bottom, or horizontal planes, are of very ſmooth, polite and even ſurfaces; but if attentively examin'd, will be ſeen to be very evenly, tho' not very finely ſtreak'd with tranſverſe ſtriæ; the Rhombs in the ſame manner ſhew the commiſſures of the plates, and the Trapezia, if nicely examin'd, the ends of the fibres that compoſe them. It is uſually of about an inch in length, not often more, but very frequently much leſs, and is compos'd of a very conſiderable number of horizontal plates or flakes, each very thin, and itſelf made up of parallel filaments, not very ſmall or fine, running obliquely acroſs it: This is one of the more ſimple conſtructed ſpecies; the filaments are no where bundled into faſciæ, nor the plates form'd into thicker maſſes, but every plate, and every fibre are ſeparate, only cloſely arrang'd together. It is in the maſs very eaſily fiſſile, both horizontally and perpendicularly, and its plates are moderately flexile, but not elaſtic; it is very bright, and conſiderably tranſparent; ſo ſoft as to be eaſily ſcratch'd by the nail on the horizontal planes; and naturally perfectly colourleſs as water, tho' ſubject, like the reſt, to be ting'd by clay; of a conſiderable weight, and neither giving fire with ſteel, nor fermenting with Aqua Fortis, but readily calcining into a white maſs.

Examin'd by the Microſcope, its conſtituent filaments appear conſiderably thick, and very evenly laid together.

It is frequent in the pits of Northamptonſhire, and in ſome other counties.

2. *Tetradecarhombis craſſior, hebes, ſtriis tenuiſſimis, tranſverſis.* *Dull, thicker, Tetradecarhombis, with very thin, tranſverſe filaments.*

This is a leſs beautiful ſpecies than the former, but of a very perfect and regular figure. It conſiſts, like that, of fourteen planes, made out of the uſual ten of the ordinary Rhomboidal kinds, by a ſubdiviſion of each of the four Rhombs into two, conſtituting eight Rhombs, two horizontal ſurfaces, and four Trapezia. Its ridge or limb is very prominent, and plac'd not nearly in the center of the body, but ſo unevenly, that the Trapezia on each ſide are of very different breadth, as are alſo the Rhombs of the ſame end each way. It is conſiderably thick, and broad in proportion to its length; its breadth it is pretty conſtant in, but its thickneſs is very variable and uncertain; it is ſo regularly and evenly tabulated, that its Rhombs are of as equal ſurfaces as its horizontal planes; Its filaments, however, are not ſo regular in their length, for the Trapezia are often a little cavernous. The horizontal planes, have tolerably ſmooth, but not very gloſſy ſurfaces; and if held obliquely to the light, may be diſcovered to be very finely ſtriated acroſs in an oblique direction. It is uſually conſiderably large, between two and three inches being its common length: It is compos'd of a number of extreamly thin plates, laid together in ſeveral congeries; and theſe together conſtituting the Rhomboide; theſe are compos'd of an almoſt infinite number of parallel filaments, the ends of which make the Trapezia and their extream edges the Rhombs; they are bundled or collected into faſciæ, and run tranſverſely in an oblique direction, and are generally croſs'd by three, four, or ſometimes five longitudinal ſtreaks, much broader than the ſingle filaments of the plates. The maſs is very eaſily fiſſile in an horizontal direction, but is very ſhattery, and apt to fall in pieces, both according to the tranſverſe fibres, and the longitudinal ſtreaks which interſect them; the flakes, when ſeparated, are leſs flexile than thoſe of moſt of the other ſpecies, and not at all elaſtic; they have alſo leſs brightneſs than moſt others, and the maſs itſelf much leſs tranſparence; they are eaſily ſcratch'd on their ſurfaces, and are of a ſomewhat duſky look, and whitiſh colour. It is of the ſame weight with the reſt, and like them will neither give fire with ſteel, nor ferment with Aqua Fortis, and calcines more readily than moſt others to a perfect whiteneſs.

Examin'd by the Microſcope, its filaments appear finer than thoſe of moſt others, but leſs regularly laid together; and the plates when unhurt have much the appearance of thoſe of many others after bending; it is natural enough to imagine this duſkyneſs and opake white colour owing to an admixture of a white earth with the matter of the maſs; but this obſervation by the Microſcope gives great room rather to believe, that its whiteneſs and opacity are merely owing to the irregular diſpoſition of its filaments; which makes it much the ſame in its natural ſtate with the others when their fibres are diſturb'd by bending.

It is a very rare ſpecies, and, ſo far as I have yet learn'd, found only in Leiceſterſhire, in a yellow brick clay at ſmall depths.

3. *Tetradecarhombis longiſſimus, ſquammoſus.*
The longeſt, ſcaly Tetradecarhombis.

This is a very extraordinary ſpecies; its length, however, is more truly remarkable than its ſcaly look, which is indeed owing to nothing more than many of its plates being compos'd of oblong and irregular ſmaller ones; it is ever of a regular and conſtant figure, compos'd of fourteen planes, made, as in the former, from a ſubdiviſion of the Rhombs; its ridge is not very prominent, but placed ſo obliquely in the maſs, that the two Trapezia on the ſame ſide are ever very different in breadth, as are alſo the oppoſite Rhombs; it is ever remarkably long in proportion to its breadth, and uſually of conſiderable thickneſs, but in this laſt particular, it is very variable and uncertain; it is ſo very irregularly and unevenly tabulated, that its Rhombs appear inſtead of the ſmooth ſurface of the others, with long and parallel ridges one over another, like the rows of tiling on a houſe, and theſe often not ſtrait, but variouſly inflected; its Trapezia have a very curdled look, but are leſs cavernous than in many of the other kinds; its horizontal planes are perfectly ſcabrous and ſcaly, not of one plate each as is uſually the caſe in theſe bodies, but each compos'd of a vaſt number of oblong and narrow flakes, or parts of flakes falling very irregularly over one another, and very variouſly broken and diſtorted; it is uſually of conſiderable ſize, three inches being a common length with it; it is compos'd not only on the ſurfaces, but throughout, as may be ſeen by ſplitting it in various parts, of conſiderably coarſe and thick plates, made up of the like oblong partial ones with thoſe on the ſurface, and theſe of very fine and very numerous ſtrait filaments; which are indeed longitudinal in them if view'd ſeparately, but if conſider'd as a part of other flakes, and according to their diſpoſition and ſituation in the maſs, they are truly tranſverſe, and laid in the ſame oblique direction with the reſt of the filaments of this Genus of Selenitæ; the maſs is very readily fiſſile, but if ſplit into too thin plates, they fall into theſe partial ones, if into thicker they are ſeen irregularly compos'd of them, they are leſs flexile than moſt others, and not at all elaſtic, conſiderably bright and gloſſy, but not ſo tranſparent as in ſeveral others; they are ſoft and eaſily ſcratch'd on their flat ſurfaces, perfectly colourleſs when pure, as indeed they almoſt conſtantly are, and conſiderably heavy.

It will not give fire with ſteel, nor ferment with Aqua Fortis.

It but ſlowly calcines to a whiteneſs.

Examin'd by the Microſcope, the ſeparate flakes appear but very irregularly put together, and compos'd of conſiderably large and thick filaments, not diſpos'd in faſciæ, but evenly diſtributed thro' all parts of the flakes.

It is not unfrequent in Yorkſhire, both looſe on the hills, and lodg'd in the ſtrata of Clay, and is frequently found with ſmaller ones partly immers'd in it; in which ſtate it makes a very extraordinary and agreeable figure.

SERIES III.

CLASS I. ORDER II. GENUS I.

ISCHNAMBLUCES.

1. *Iſchnamblucis latus, pellucidus.*
Flat and broad, pellucid Iſchnamblucis.

This is a very beautiful Foſſile, and not only the moſt pure and pellucid of this Genus of Selenitæ, but at leaſt equal to the fineſt of the whole claſs; it is a perfect and regularly form'd body, and never found otherwiſe than in the form of a flat hexangular column, compos'd of two large horizontal planes, which make its top and bottom, and four lateral ones, its Trapezia; its ends are ever irregularly abrupt, and look as if broken off by violence, and exhibit ſeveral variouſly notch'd and angular figures; theſe have not the limb or ridge ſurrounding their whole body as the Rhomboidal kinds have; but tho' the ends being thus abrupt, have no Rhombs to be thus divided, the Trapezia are regularly ſeparated by it on each ſide, and it is very prominent, running length way from end to end on each ſide of the column; it is uſually conſiderably broad in proportion to its length, but never very thick; it is ſo regularly tabulated, that the planes of its Trapezia are as ſmooth, polite and gloſſy as its horizontal ones, and its abrupt ends are generally tolerably ſmooth tho' leſs gloſſy; its horizontal planes, or top and bottom, are of an extreamly ſmooth, bright and gloſſy ſurface, not furrow'd with the ſlighteſt wrinkle, or mark'd with any viſible ſtriæ, but on one of the ſurfaces there runs a longitudinal ſtrait line, directly down the whole length of the body, and nearly in the middle of the planes; this uſually, on breaking, is found to reach half way thro' the body, the other half being not at all affected by it. It is various in ſize, but its moſt uſual ſtandard is about three inches in length, a little more than an inch in breadth, and about one third of an inch in thickneſs; it is found ſometimes vaſtly larger than this, and at times very ſmall; in neither of which caſes, however, it departs much from the proportion of breadth and thickneſs for length; it is compos'd of a vaſt number of extreamly thin and beautifully pellucid plates, arranged elegantly together, and each of them of the ſize of the whole horizontal ſurface, each ſurface being only of one continued plate on that ſide where the longitudinal ſeam or line is not, and on that where it is, each ſurface conſiſts of two plates join'd at that line; theſe plates are compos'd like thoſe of the Rhomboidal kinds, of a vaſt number of regular and equal filaments laid cloſely together, and running obliquely acroſs the body; when the column is broke tranſverſely, theſe are very beautifully ſeen upon the edges of the plates; and on that ſide, or in that part of the maſs where the longitudinal ſeam does not interrupt them, they run in a continued ſeries acroſs the body; where that comes they neceſſarily form two ſeries, each terminating at one end, at that and at the other at the edge of the body; theſe are each ranged obliquely as in the other plates, but are uſually diſpos'd in the two flakes they compoſe, obliquely the two different ways; and thence neceſſarily make an angle with one another, which riſes to each edge of the column, and makes a notch in it, whoſe deepeſt part is at the medial ſeam. There are indeed a double row of narrower plates in this part, and only a ſingle one of broader in the reſt of the column; the flakes when ſeparated, are very bright and pellucid, and conſiderably flexile for thoſe of a Selenites, but they have not the leaſt elaſticity, uſually remaining bent as they are ſet; the whole maſs is very fiſſile, and is eaſily parted into theſe, and may be broken with not much more difficulty acroſs, according to the direction of the conſtituent fibres of theſe plates; on the ſide where the ſeam is, the whole ſurface may with care be taken off in one flake, the commiſſure of the two of which it is compos'd, being ſo nice and cloſe, but it very eaſily ſeparates into two regularly at it; the whole column is very bright, gloſſy and tranſparent, but is ſoft and eaſily ſcratch'd on the horizontal, tho' not on the lateral ſurfaces; it is perfectly colourleſs as water, but ſubject to be foul'd in many parts with admixtures of clay, and ſometimes, tho' rarely, has theſe foulneſſes in form of ears of graſs, as is uſually the caſe in another ſpecies hereafter to be deſcrib'd.

It is moderately heavy, and will not ferment with Aqua Fortis.

It will not give fire with ſteel, but calcines pretty readily in the fire.

Examin'd by the Microſcope, its ſtructure is evidently diſcover'd to be wholly like that of the Rhomboid kinds; only, that inſtead of each plate aſſuming that figure, each is here of a great length in proportion to its breadth, and ſo ſhap'd, that a congeries of them muſt form a column of this kind; it might ſeem at firſt ſight a very manifeſt diſtinction into different ſpecies, at leaſt, that in ſome ſpecimens of this, one ſingle row of flakes does this, and in others there are two rows nicely join'd to effect it; but a careful obſervation of numbers of ſpecimens will ſhew, that nature only plays in this, for ſome few ſhall be found wholly without this, ſome others with it wholly pervading their thickneſs; but tho' the moſt frequent inſtances are of its regularly pervading half way, it is often loſt in one or other end of theſe ſpecimens; and ſometimes takes in the aſſiſtance even of a third ſet of plates, in a part only of the ſame ſpecimen; the filaments that compoſe the plates of this ſpecies are extreamly minute and fine, but are ſeen very beautifully diſtinct on cruſhing or bending the plates.

It is found in conſiderable plenty in Oxfordſhire, Northamptonſhire, and Yorkſhire, and in ſome other parts of the kingdom; it uſually lies at conſiderable depths, and in a blue clay.

Dr. Woodward has eſtabliſh'd an opinion of this being no other than a congeries of two rows of Selenitæ, each joining to the other at the ends, and each row being join'd to the other at their ſides, V. 1. p. 72. But there is not the leaſt foundation in nature for ſuch a conjecture; the Doctor does not obſerve, that the ſeam he is ſo fond of for the commiſſure of theſe Rhombs, goes uſually but half thro' the body, and is often quite wanting; that there are in nature no Rhomboidal Selenitæ that could conſtitute the other half; and that if theſe double plates were of Rhomboidal ſmall ones, the Rhombs and Trapezia muſt be almoſt all cut off into ſo many planes; and as we ſee the ſeam for the commiſſure of thoſe two really diſtinct plates which compoſe that ſurface, and that they readily break with the ſlighteſt force exactly according to it; if they were compos'd each of ſo many Rhomboides join'd together, the commiſſures of each of theſe muſt be viſible in ſuch another ſeam, and the plates muſt in like manner ſeparate readily and naturally into ſuch Romboides; no ſuch thing ever happens, however, nor is any ſuch ſeries of commiſſures ever ſeen; tho' from the general and fix'd laws of nature in all her works, we may determine, that had they been really compos'd of ſuch Rhomboides, it muſt have been ſo ſince, as they were in ſuch a ſtate when brought together, as to be join'd at this commiſſure pretty firmly, but not at all to obliterate the mark of it, they muſt have left the ſame as viſible at their other commiſſures if there were any ſuch; the columns, on the contrary, have never the leaſt ſign of any ſuch mark, and will not break in any one place more readily than any other, but are as truly as the plates of the Rhomboide kinds themſelves, one continued flake of the length of the column, and in one ſpecies ſtriated longitudinally, or compos'd of filaments continu'd thro' the whole length.

2. *Iſchnamblucis craſſior, hebes, ſuperficie, ſcabra.*
Dull, rough-ſurfac'd, thicker Iſchnamblucis.

This, tho' of leſs brightneſs than the former ſpecies, is a very elegant and ſingular kind; it is a perfect and regularly form'd body, and ever conſiſts of two horizontal, and four lateral oblique planes, in a top and bottom, and on each ſide two Trapezia; the whole giving the form of a flatted hexangular column, with its ends abrupt and irregular as in the former ſpecies; the ridges parting the Trapezia, are in this ſpecies leſs prominent than in the former; often indeed they are wanting, and long cavities are found in the place of them, as is ſometimes the caſe in ſome of the Rhomboidal ones; but this is in both ever merely accidental. This is ſomewhat narrow in proportion to its length, and thick for its breadth; it is very irregularly and unequally tabulated, and its Trapezia conſiſting of edges of plates lying variouſly over one another, repreſent the tiled top of a houſe; the ſurface of is horizontal planes is variouſly rough, ſcabrous, ridg'd and irregular, being uſually compos'd of imperfect plates, and in ſome degree reſembling the ſcaly figure of the Trapezia; in all this, however, this, and the other rough kinds are uncertain as to degree, ſome of them being more, ſome leſs ridg'd, and rough, and indeed there are not wanting inſtances of the ſmootheſt kinds, having their plates ſometimes a little uneven; ſo that this is not to be look'd on alone as ſufficient to diſtinguiſh a ſpecies, tho' it make a good circumſtance in the deſcription, as the ſame ſpecies are uſually ſomething regular in it. It is of various ſizes, but moſt frequently of about two inches in length, half an inch in breadth, and about a quarter of an inch in thickneſs; it is compos'd of flakes or plates as the former, and uſually has the ſame longitudinal ſeam running half way thro' it, and making the ſide where it is, conſiſt of a double row of long and narrow plates; as the other does of a ſingle one of very broad ones. Theſe plates are all compos'd of a multitude of ſomewhat large and coarſe filaments, laid very evenly together in an oblique tranſverſe direction: and are interſected by a few obliquely longitudinal ſeams; the whole column is very readily fiſſile, but will not ſeperate into ſuch thin flakes as the former; it very eaſily breaks alſo tranſverſely in the oblique direction of the fibres; its plates are very little flexile, and not at all elaſtic, and the whole column has much leſs brightneſs and tranſparence than the former ſpecies; it is not perfectly colourleſs, but has ſomething of a dead whitiſh look; and it is ſo ſoft as to be very eaſily ſcratch'd.

It is moderately heavy, and will neither give fire with ſteel, nor ferment with Aqua Fortis.

It burns to a ſnow white in few moments on a briſk fire.

Examin'd by the Microſcope, the filaments it is compos'd of are ſeen to be conſiderably thick, and bundled into variouſly ſiz'd faſciæ; to this thickneſs of the fibres the thickneſs of the plates of the body is owing. It is more opake than moſt of the Selenitæ, and ſeems in a great meaſure to owe it to the irregular arrangement of its fibres, not to any mixture of earth, ſince it looks naturally much as we make the others look, by cruſhing and bending them.

It is found in the Clay in various parts of Kent, and no where in more abundance than on the ſhores of Sheppey iſland.

3. *Iſchnamblucis hebes, ſtriis tenuiſſimus, longitudinalibus.*
Dull, longitudinally-ſtreak'd Iſchnamblucis.

This, tho' of leſs beauty than ſome other ſpecies, is a very ſingular and remarkable one, and were there no other arguments againſt the Woodwardian ſyſtem, of theſe columnar Selenitæ being congeries of Rhomboidal ones, this wou'd alone overthrow it; ſince the filaments of which the plates of this ſpecies are compos'd, run the whole length of the column entire, regular and without interruption; which cou'd not be the caſe were not thoſe plates truly and really one continued ſurface.

It is a flat hexangular column, compos'd of two horizontal ſurfaces, and four Trapezia, with a very prominent ridge on each ſide, dividing the Trapezia, and making a ſomewhat acute angle; this is not plac'd regularly in the middle of the column, but parts the whole into two Trapezia of unequal breadth on each ſide; this ſpecies is generally very long and ſlender, its breadth and thickneſs both bearing a ſmall proportion to its length in compariſon of moſt of the other Selenitæ; it is but unevenly and irregulated tabulated,

lated, its ſides being ever ridg'd, and the ſurfaces of its horizontal planes ſeldom perfectly ſmooth, or compos'd of ſo gloſſy a plate as many of the others, tho' almoſt always of one ſingle one; and where it is not ſo, of long not tranſverſe parts of more. It is commonly ſmaller than the ordinary columnar kinds, an inch and half being its uſual length, and its breadth and thickneſs not much more than a quarter of an inch each; and however much it varies in its ſize, it uſually keeps very regularly to this proportion. It is compos'd of a great number of extreamly fine and thin flakes, laid very cloſely and evenly on one another; and theſe are wholly made up of ſo many ſeries of ſlender filaments laid cloſe ſide by ſide, and reaching in ſomewhat an oblique direction the whole length of the column, without being interſected by the ſlighteſt tranſverſe ſcratch or ſtreak; the column is very fiſſile, and is parted horizontally with great eaſe into a great number of plates; it will alſo break with eaſe longitudinally, according to the direction of the filaments, and perpendicularly to the horizontal planes; but will not by any art be made to break regularly, tranſverſely as all the other columnar Selenitæ readily do, becauſe their filaments are diſpos'd obliquely acroſs them. This is an evident proof of the columns being a real and natural figure, and not compos'd of Rhomboides; ſince if it were, it would certainly very readily part at their commiſſures, as it freely does at the longitudinal ſeam, which like the reſt, it frequently has on one ſide, and which is in this always particularly large and plain: its plates are but very poorly flexile, and not at all elaſtic; it has little brightneſs, and but a ſmall degree of tranſparence, is ſomewhat whitiſh in the maſs, and is very ſoft, and eaſily ſcratch'd.

It is moderately heavy, and will not ferment with Aqua Fortis.

It will not give fire with ſteel, but readily calcines to a ſnow white.

Examin'd by the Microſcope, its plates appear ſomewhat irregular in thickneſs, and ſometimes wav'd, bent and crooked; ſometimes there are ſeen on the horizontal ſurfaces imperfect flakes, or parts of plates, but theſe are ever, tho' very narrow, of the whole length of the column, the filaments are plainly of the whole length of the column, and uninterrupted.

It is found in the clay-pits of Yorkſhire, and ſome other of the northern counties, and is frequently foul'd with blotches of a blue or brown clay, often irregularly diſpos'd in different parts between or among the plates, but more frequently juſt in the middle of the column in form of an ear of graſs.

4. *Iſchnamblucis ſquammis, craſſioribus.*
The thick, ſcal'd Iſchnamblucis.

This is a ſpecies that at times puts on very various forms, and might miſlead a young ſtudent either to confound it with ſome other ſpecies, or to make more than one imaginary ſpecies out of it; but the thickneſs of the flakes it is compos'd of, is, if carefully attended to, an everlaſting diſtinction for it from all the other Selenitæ; and its various forms, if ſtrictly examined, will be found to be no more than mutilated appearances of its true and natural form; it is a long and narrow column, but ſomewhat thick, compos'd of two horizontal planes, four Trapezia, and two abrupt ends; its ridges which part the Trapezia are ever very fair and prominent, it is very unequally and irregularly tabulated, and appears compos'd of a number of irregular thick plates laid careleſly and uncertainly over one another, and very often broken or mutilated; the edges of fifty being ſometimes to be ſeen in undulated notches on the top, or naturally upper horizonal ſurface, which is that alſo, ſo far as I have yet obſerv'd, by viewing them in their natural ſituation in the ſtrata, that has not the longitudinal ſeam common to this, with moſt of the other columnar ſpecies, but which is compos'd of continued and ſingle plates. The irregular diſpoſition of theſe flakes and parts of flakes, is the occaſion of the roughneſs of the ſurfaces of the Trapezia in this ſpecies, which are all ſhelv'd and ridg'd like the tilings of a houſe; it is of various ſizes, from one to four inches in length, and moderately thick in proportion, but always narrow, and its horizonal planes conſequently ſmall; it is compos'd, as all the reſt, of flakes or plates laid horizontally on one another; but they are very remarkably thick, and often broken, and notched on the ſurface; theſe are compos'd of a number of very large and coarſe filaments, running obliquely acroſs the column, but interſected ſometimes with ſix or eight longitudinal ſtreaks, beſide the great middle ſeam which uſually divides one of the planes. The irregular diſpoſition of the ridge in ſome of the ſpecimens of this, and its being obliterated, as it wholly is in ſome others, with the accidental injuries this like all other even much harder bodies, waſh'd about on the ſea ſhores, are ſubject to, give it at times ſo various an appearance, that it is ſcarce to be known for the ſame thing; the ridge is ſometimes placed ſo obliquely, that it almoſt joins on the two ſides of the column, the oppoſite edges of its top and bottom; ſo makes the two Trapezia on each ſide extreamly unequal in breadth, one of them being four, or even ſix times as wide as the other; at other times it is ſo worn down by the toſſing about of the body on the ſhores, as to be almoſt obliterated and loſt; and at others, a common ſhortneſs of the filaments that compoſe the central plate of the column, whoſe extream verge this is, makes us find a cavity anſwering to its length on each ſide, and plac'd juſt where it ſhould be; to theſe variations it muſt be added, that nothing is more frequent than to find the column ſplit exactly in half at this ridge, and the halves making as it were natural columns; all theſe, however, the young ſtudent being once warn'd, will beware of; it is very fiſſile, and eaſily parts horizontally into ſo many of theſe thick flakes as the eye can diſcover at the edges that it is compos'd of; but theſe are never to be divided horizontally any farther. Tranſverſely alſo in the direction of the filaments, they break very eaſily, they are moderately flexile, but not at all elaſtic, and have but little brightneſs, and a more obſcure tranſparence than thoſe of moſt other kinds; they are naturally either colourleſs, or a little whitiſh, and are ſoft and eaſily ſcratch'd on their horizontal ſurfaces.

It is moderately heavy, and will neither give fire with ſteel, nor ferment with Aqua Fortis.

In the fire it burns eaſily to a pure white.

Examin'd by the Microſcope, the filaments that compoſe the plates appear very coarſe, large and thick; and hence is the thickneſs of the plates themſelves, for they conſiſt like thoſe of the reſt, of only a ſingle row of them.

It is frequent on the ſhores of Sheppey iſland, as alſo on the ſhores, and in the clay-pits of Yorkſhire; it is frequently, like the reſt, clouded and ſpotted with clay, the ſame with that of the ſtratum in which it lies, and there have been inſtances of its having been found among coal, and ſpotted with the matter of that Foſſil; the clay, or other extraneous matter in this and the other columnar ſpecies, is frequently diſpos'd in an oblong and notch'd form in the center of the column; in this caſe, it not unaptly reſembles an ear of graſs, or part of one, and has been by ſome miſtaken for real graſs included in the ſubſtance of it; but the better judges have ever known it for mere clay accidentally in that form.

SERIES III.

CLASS I. ORDER II. GENUS II.

ISAMBLUCES.

1. *Iſamblucis albidus, apicibus abruptis.*
Whitiſh Iſamblucis, with broken ends.

This is a perfect and regularly form'd body, and in ſome degree reſembles a broken and foul ſprig of cryſtal; it is very regularly hexangular, and compos'd of ſix equal, or nearly equal planes; the top and bottom of which would ſcarce be at all diſtinguiſhable from the Trapezia, but by the ſmoothneſs of their ſurfaces, and the poſition of the ridge, for they are often narrower than part of the Trapezia; the ridge is ſeldom very prominent, and in this ſpecies is frequently almoſt obliterated.

It is of different ſizes, from half an inch to four inches long, but its moſt frequent length is an inch and half, and its thickneſs with that length is uſually one third of an inch; it is ſo evenly tabulated, that the Trapezia are of tolerably equal tho' much leſs ſmooth and gloſſy ſurfaces than the top and bottom; and the ſurfaces of thoſe planes are uſually very ſmooth to the touch, compos'd of one plate only, and ſometimes, but not often, are mark'd with the longitudinal ſeam ſo frequent in the columnar Selenitæ. It is compos'd throughout the whole column of parallel and extreamly thin and fine plates, or flakes, and thoſe of very minute and ſlender filaments, arrang'd in a beautiful order, and running obliquely acroſs the body of the column. It is eaſily ſeparated horizontally into almoſt an innumerable quantity of theſe, and they readily break tranſverſely according to the order of the filaments that compoſe them. The plates are very flexile, but not at all elaſtic, and have a gloſſy look, but nothing of the brightneſs or tranſparence of thoſe of ſome other ſpecies. The whole is ſoft and eaſily ſcratch'd, not only on the flat ſurfaces of the plates, on the horizontal planes, but on their edges in the Trapezia, which is not the caſe in any other ſpecies ſo remarkably; they are not colourleſs, or like water, as many of the purer Selenitæ are; but have ever a white or chalky foulneſs very viſible in them; they are more weighty than any of the others; but will, no more than they, give fire with ſteel, or ferment with Aqua Fortis, and burn like the reſt to a fine and pure white.

Examin'd by the Microſcope, it appears of a more cloudy texture than moſt of the other ſpecies; its filaments are extreamly fine, very evenly diſpos'd, and not ſo eaſily diſplac'd by bending the flakes, as thoſe of many others are; but when they are, it is plainly ſeen that they are all collected into ſmall faſciæ, ſome of which remain unhurt, and as clear as before; while others are diſunited, and render'd more white, and perfectly opake.

I know of only one place where this ſpecies is found, which is in the ſtrata of white Tobacco-pipe clay, in the neighbourhood of Northampton: It is very frequent there, and ſeems to have taken up ſome of that earth at its original concretion.

2. *Iſamblucis pellucidus, brevior, ſtriis tenuibus.*
Pellucid, ſhort Iſamblucis, with ſlender filaments.

This is a much more elegant and beautiful ſpecies than the former, and more approaches to the cryſtalline figure and look; for here the ſurfaces are generally all very equal, and the whole pellucid as water, and not leſs bright than a column of cryſtal. It is an hexangular column like the former, conſiſting of ſix nearly equal ſides or planes, and two abrupt ends; the ridge is very viſible and prominent between the Trapezia on each ſide, and is uſually plac'd very regularly thro' the center of the column, whence the Trapezia are all of the ſame breadth: The whole column is of all this order the ſhorteſt in proportion to its breadth, or more properly its thickneſs; it is extreamly evenly tabulated, and the ſurfaces of its Trapezia are in conſequence very nearly as ſmooth, tho' not quite ſo gloſſy as the horizontal planes, or top and bottom, which are ever diſtinguiſhable from them by an accurate eye, by their being brighter, and compos'd of the flat ſurface of one plate, not the join'd edges of many. Its uſual length is about an inch, and its diameter, where of this length, is not leſs than one third of it; it is not unfrequently found very ſmall, and ſometimes of three or four inches long, and a proportionable thickneſs; it is compos'd of a vaſt number of thin, and extreamly pellucid and bright parallel plates, laid with a ſurprizing evenneſs and regularity horizontally over one another; theſe are compos'd of a great number of fine and ſlender filaments, cloſely arrang'd together, and running in an oblique direction acroſs the column. On one of the horizontal planes is uſually ſeen the longitudinal ſeam ſo frequent in the columnar Selenitæ, but in theſe it goes but to a ſlight depth, and not more than one ſixth, or ſometimes one eighth of the body is compos'd of two plates to each ſurface join'd at this ſeam, all the reſt of one only. It is leſs eaſily fiſſile than moſt of the other kinds, its plates cohering more firmly together than thoſe of the others; with care, however, it may be ſeparated into a great number of horizontal plates, which are found not to be lodg'd ſingly on one another, but evidently collected firſt into faſciæ, ſince in many places one may find the way pretty readily to divide off a number of thick bundles, or congeries of plates, but can never divide them any farther, tho' viſibly compos'd of many; the thinner flakes ſhew themſelves to be very flexile tho' not elaſtic, if bent in a tranſverſe direction to the length of the column, for if bent the other way, they very freely and readily break off according to the oblique direction of their conſtituent fibres. The whole column is very bright and tranſparent; it is colourleſs as water, but ſubject like the reſt to be accidentally foul'd and ſpotted with clay; it is ſo ſoft as to be very eaſily ſcratch'd, and is of conſiderable weight.

It will neither give fire with ſteel, nor the leaſt effervеſcence with Aqua Fortis, but readily burns to a pure white.

Examin'd by the Microſcope, the plates appear extreamly pellucid, not leſs ſo than thoſe of the fineſt Talc, and the filaments that compoſe them are ſmall and ſlender, and collected into ſeparate faſciæ.

It is found in the hilly parts of Yorkſhire, ſometimes lying on the ſurface, but uſually at ſmall depths in digging among the yellow clays.

SERIES III.

CLASS I. ORDER II. GENUS II.

OXUCIÆ.

COLUMNAR *Selenitæ, not truncated, but tapering off to a point at each end.*

1. *Oxucia pellucida, ſquammis tenuiſſimis, filamentis tranſverſis.*
Oxucia, with thin flakes, and tranſverſe filaments.

This is a very elegant ſpecies, and as ſoon as any kind might be miſtaken at firſt ſight for a ſprig of the double pointed cryſtals. It is compos'd of ſix nearly equal planes, two horizontal, a top and a bottom, and four lateral its Trapezia; but has no abrupt ends, or any other planes than theſe, but tapers both ways to a point, ſometimes ſharp, ſometimes more obtuſe; the limb or ridge between the Trapezia is moderately prominent, and runs to the very points of the body, where ever ſo ſharp, and indeed is more diſtinguiſhable there than in any other part of the column. It is conſiderably long in proportion to its thickneſs, and as its planes are nearly equal, is of no more breadth one way than another; it is tolerably evenly tabulated, but the edges of the plates, tho' not more prominent one than another, are always diſtinguiſhable by a nice eye on the Trapezia; if view'd obliquely, and in a proper light, the other ſurfaces on its top and bottom are perfectly ſmooth, bright and gloſſy, and never have either of them the common longitudinal fiſſure of the other columnar kinds. It is various in ſize, from one tenth of an inch in length, to three inches, but its uſual ſtandard is a little more than an inch, and with that length it has not more than one eighth of an inch in diameter; it is compos'd of parallel plates, laid very beautifully and evenly on one another, in an horizontal direction, and each making one whole ſurface of the ſtone; theſe are compos'd of very fine and ſlender filaments, laid obliquely acroſs the plate, and are themſelves neceſſarily very fine and thin alſo, as no plate of this kind is ever compos'd of more than one ſeries of theſe filaments. It is readily fiſſile according to the direction of theſe plates, and freely ſeparates into a multitude of them, and that equally eaſily in any part of the column; whence it is plain, they are not collected into any congeries, but are laid ſingly one over another, and cohere equally firmly together; they are but very little flexile, and not at all elaſtic; if bent length way of the plate, they break almoſt immediately according to the direction of the fibres; but if tranſverſely, they bear a little force, and bend a little way, and do not return to their ſtraitneſs again; they are very bright and pellucid, and at leaſt equally ſo with the fineſt foliaceous Talcs, but they are ſofter than moſt others, and very eaſily ſcratch'd on their flat ſurfaces; the whole maſs is colourleſs as water, and may be read thro' as eaſily as the thinneſt plate of fine glaſs.

It is of moderate weight, and will neither give fire with ſteel, nor ferment with Aqua Fortis, but burns readily to a pure white.

Examin'd by the Microſcope, the plates, after a ſlight bending, appear compos'd of fine ſlender filaments, not arrang'd together in faſciæ, but laid evenly one by another, ſo that the whole flake, compreſs'd or bent, is uſually render'd white and opake at once, not partially and in ſtreaks, as is frequently the caſe in many of the other ſpecies.

This is a very rare ſpecies: I remember to have pick'd it out in ſome quantity from the clayey banks of the river Nen, at a mile's diſtance from the town of Peterborough, but know of it in no other place.

2. *Oxucia hebes, ſquammis craſſioribus, filamentis longitudinalibus.*
Dull Oxucia, with thick plates, and longitudinal filaments.

This is exactly of the figure of the former, but otherwiſe as different from it in all reſpects, as two bodies of the ſame Genus poſſibly can be. It is like that a long and ſlender column, going off into a point at each end, and compos'd of ſix very nearly equal planes, two of them made up of the flat ſurfaces of its conſtituent flakes, and the other four of their edges, parted on each ſide by the ridge, ſo univerſal in this claſs of Foſſils, or in its place by a cavity of ſmall depth. It is but irregularly and unevenly tabulated; its Trapezia are ridg'd, and lie one flake over another, like the tiling of a houſe; and its horizontal planes are ſeldom made up of one entire plate, but of the parts of many laid over one another, and furrow'd and ridg'd very deeply, as the plates are all thick; it is uſually of about two inches in length, and a little more than a quarter of an inch in diameter, and is compos'd throughout of plates very thick and coarſe, whoſe conſtituent filaments are thicker than in moſt others, and very diſtinct even to the naked eye, and without bending, or otherwiſe injuring the body; they have alſo a few tranſverſe ſtreaks, not more than four or five in the whole length of the column, which interſect theſe, and make ſomething like irregular Rhomboide delineations on the ſurface; which when it is ſmooth, and made of one only plate, look beautiful enough. It has never the leaſt mark of any ſtrait longitudinal ſeam, but is of the ſame ſtructure throughout its whole thickneſs: It is very readily fiſſile into its ſeparate plates, which are conſiderably thick, but cannot be divided horizontally again, nor broken eaſily acroſs, as thoſe of the other ſpecies; but according to the direction of the fibres which is longitudinal in this, will break as readily that way as the others tranſverſely; the tranſverſe ſtreaks, tho' very viſible, are of no effect in the breaking of the plates, but the fragments they ſeparate into this way, are all of the length of the column. They are very little flexile, and not at all elaſtic, but dull and dead to the eye, and very ſlightly tranſparent, tho' much more ſo than their combination in the column ſeems to promiſe, ſince in that it is much more opake than any other ſpecies; it is of an opake whitiſh colour, very ſoft, eaſily ſcratch'd, and conſiderably heavy.

It will neither give fire with ſteel, nor ferment with Aqua Fortis, and calcines but ſlowly to a whiteneſs.

Examin'd by the Microſcope it appears compos'd of extreamly large and coarſe filaments, arrang'd irregularly in faſciæ of different ſizes, and much more eaſily diſturb'd and diſplac'd in ſome of them, than in others; ſo that the flakes, when bent, appear ſtreak'd with a perfectly opake white, and their own duſky, but in ſome degree tranſparent hue.

It is no uncommon kind in Yorkſhire, and generally lies near the ſurface; they find it throughout the county in yellow, and ſometimes in blue clay.

SERIES III.

CLASS I. ORDER III. GENUS I.

INAMBLUCIÆ.

SELENITÆ columnar, abrupt, and of a ſeemingly fibroſe texture.

Theſe conſtitute only one Genus, of which there are no more than two known ſpecies, and thoſe both of the columnar figure.

1. *Inamblucia, ſtriis tenuiſſimis.*
Inamblucia, with very fine filaments.

This is a very ſingular ſpecies of the Selenitæ, and but for its regular figure wou'd be miſtaken by any body for a piece of ſome Fibraria. It is ever found in form of an hexangular column, broken off at each end, and with all its planes very nearly equal. It has no ridge or rim ſo frequent in the plated Selenitæ, and is ſo evenly and regularly every where of the ſame ſtructure, that there is no diſtinguiſhing it into top and bottom, and Trapezia, like the other plated ones, but all its planes appear exactly alike; its edges are all ſtriated, and that very evenly and beautifully, and its filaments every where continu'd from end to end, without interruption, or the leaſt appearance of any tranſverſe ſtriature. It is uſually of about an inch and half, or a little more in length, and near half an inch in diameter; and inſtead of the plated or flaky texture of the other Genera of the Selenitæ, is compos'd only of a vaſt number of very bright and fine parallel filaments. It is obſervable, that even this ſpecies has the mark of the common longitudinal ſeam of the columnar Selenitæ, and has for it a ſtrait furrow of the length of the column, and looking as if five or ſix of the filaments had been pick'd out there. The column is fiſſile to a great degree, and that equally on all its planes, but not into any thing like flakes, but mere ſimple filaments, or irregular congeries of them; they part off very eaſily in their whole length, and excel the fibroſe Talcs in flexility, but are not at all elaſtic, readily bending a great way, and never reſtoring themſelves to their original ſtraightneſs; they are extreamly bright, and ſeem moderately tranſparent when diſunited from the maſs, and are thus perfectly colourleſs as water, tho' in the column they appear white and opake.

It is conſiderably heavy, but will neither ferment with Aqua Fortis, nor at all give fire with ſteel, it calcines more ſlowly than the plated kinds, but becomes of a very pure white.

Examin'd by the Microſcope, the filaments appear extreamly bright and beautiful, and if a congeries of twenty or thirty of them is view'd together, it has very much the look of a fragment of the longitudinally ſtriated columnar Selenitæ. It is indeed very plain, that this body, tho' ſeeming ſo very different from all the other Selenitæ, is really nothing but a congeries of filaments, of the very ſame kind with theirs, only not like them rang'd into plates, but left looſe and in their native ſtate.

It is a rare ſpecies, but is found in ſeveral clay pits of Northamptonſhire.

2. *Inamblucia, ſtriis albidis, craſſioribus.*
Inamblucia, with whitiſh, thick filaments.

This is a ſpecies ſomewhat approaching to the former in ſhape and ſize, but differing conſiderably from it in the ſtructure and order of its filaments. It is ever form'd into an hexangular column, with broken ends, and conſiſts of ſix very nearly equal planes, but has a very prominent ridge, diſtinguiſhing plainly what wou'd have been the Trapezia, had their filaments been form'd into plates, from what would then have been the top and bottom, or their horizontal ſurfaces. It is very evenly and regularly conſtructed, and the ſides, or planes, all are of exactly the ſame figure. It is uſually found of about two inches, or ſomewhat leſs in length, and of about half an inch in diameter. It is compos'd of a congeries of ſomewhat coarſe and thick white filaments, very much reſembling thoſe of ſome of the coarſer Fibraria, all evenly and regularly diſpos'd, and each fibre or filament continu'd without interruption to the end of the column each way, and without the leaſt appearance of any tranſverſe ſtreaks; there is in this ſpecies no mark of the longitudinal ſeam or furrow, ſo common in ſome others; its filaments may very eaſily be ſeparated, and ſplit off from any of its ſurfaces, but none ſo eaſily as thoſe that form the ridges between the lateral ones; if we may in theſe kinds properly and determinately call any ſuch. The fibres, when ſeparated, are ſcarce at all flexile, and have no elaſticity; they are indeed very brittle, and when ſingle will hardly bear their own weight, but are apt to break of themſelves, if held out by one end; they have a chalky whiteneſs, and but a very ſmall ſhare of brightneſs and tranſparence; the maſs is eaſily ſcratch'd acroſs them.

It is very heavy, and will neither give fire with ſteel, nor ferment with Aqua Fortis, but very freely and quickly calcines in the fire to a pure white.

Examin'd by the Microſcope, it appears a congeries of filaments, rang'd in ſuch ſort of order, that they ſeem to want nothing but to cohere at their edges, to form the thick and coarſe plates of ſome ſpecies of the tabulated Selenitæ.

It is a very rare Foſſil; it is found lodg'd in the cliffs of Sheppey iſland in ſome few places, and ſometimes on the ſhores, but there is uſually ſo batter'd and injur'd, as not to be known for a Selenites, appearing rather a fragment of a coarſe Fibraria.

SERIES III.

CLASS I. ORDER IV. GENUS I.

SANIDIA.

SELENITÆ tabulated, and reſembling in external figure the foliaceous Talcs.

Of this Order there is alſo only one Genus, and of that but two known ſpecies, a colourleſs pellucid, and a whitiſh and opake.

1. *Sanidium pellucidum, decolor.*
The colourleſs, pellucid Sanidium.

This is a ſingular ſpecies of Selenites, and is the only one which aſſumes no regular form; it is found in thin flat maſſes of different ſize and ſhape, but never at all emulating either the columnar or Rhomboidal figure; and is ſo evenly tabulated, that its edges made by the commiſſures of the extremities of its flakes, are very ſmooth and even, and never have any conſiderable ridges or furrows; theſe, however, want the gloſs and brightneſs of the ſurfaces of the flakes, which are not at all inferior in either to thoſe of the very pureſt and fineſt of the angular ſpecies. It is found of various ſizes, from one inch to a foot in length, and of no determinate breadth; but uſually narrow in proportion to its length, in the very largeſt pieces, ſeldom exceeding a quarter of an inch in thickneſs; there have indeed been inſtances of its being very thick, but they are ſingularities, and not to be look'd on as the natural form, but extraordinary varieties of the ſpecies. It is compos'd of a vaſt number of extreamly minute and thin parallel flakes, and very much reſembles in all reſpects, on a ſlight view, a maſs of the ordinary foliaceous Talc, commonly call'd Iſinglaſs; but when its plates are ſeparated, as they very eaſily are, the maſs being not leſs fiſſile than that Talc, they are found to be of an extreamly different ſtructure and compoſition; and are plainly compos'd of a multitude of parallel filaments, like thoſe of the other regular form'd Selenitæ, rang'd in a beautiful order, and eaſily diſtinguiſhable on bending the flakes, ſo far as to diſunite and ſeparate them from one another; theſe flakes are very little flexile, and not at all elaſtic, and have their filaments diſpos'd in an oblique direction acroſs the maſſes, not running longitudinally thro' them. The whole maſſes are extreamly bright and tranſparent, their ſubſtance is very ſoft, and eaſily ſcratch'd; and in all things perfectly reſembling that of the regularly figur'd ones. It is, when perfectly pure, colourleſs and tranſparent as the pureſt water, but is very frequently foul'd with a ſmall admixture of clay, and thence acquires a browniſh tinge.

It is moderately heavy, and will, like the reſt, neither give fire with ſteel, nor ferment with Aqua Fortis.

It calcines but ſlowly into a fine and pure white.

Examin'd by the Microſcope, it appears perfectly and exactly of the texture of the other Selenitæ, and plainly differs from them in nothing but figure; its filaments are very fine and ſlender, and lodg'd in ſmall faſciæ, not rang'd ſingly; ſo that the flakes on cruſhing or bending uſually appear ſtriated with their own colourleſs hue, or browniſh and an opake white.

It is found in Northamptonſhire in Leiceſterſhire and Yorkſhire; as alſo among the Rhomboidal kinds in the neighbourhood of Oxford. Dr. Woodward thought the pieces of Selenitæ thus flatted, were determin'd to this ſhape by their being lodg'd in fiſſures of ſtone, where they had no room to ſhoot freely out; he errs in this, for I have found this very ſpecies many times in a looſe clay, where nothing could hinder its having aſſum'd an angular form, if nature had ever intended that it ſhould do ſo.

2. *Sanidium albidum hebes.*
Whitiſh dull Sanidium.

This is of the ſame form and ſtructure with the former, but very different in purity, and in the ſize and arrangement of its conſtituent filaments; it is of no regular or determinate form, no way affecting the columnar or angular figures of the Rhomboide kinds, but made up merely of plain even flakes, like thoſe of the foliaceous Talcs; it has no ridge, nor any appearance of the longitudinal furrow of the columnar kinds, and is uſually long in proportion to its breadth, and of but little thickneſs, tho' more ſo than the precedent; it is not ſo evenly tabulated as that ſpecies, but has its ſides uneven and ridg'd, like the tiling of a houſe, being made ſo by the irregular ſize and arrangement of its plates; the plain ſurfaces of which alſo are not nearly ſo equal, ſmooth or regular as in that ſpecies, but very frequently the plates that compoſe them are broken and defective, and the ſtriæ, or diſpoſition of the filaments, is ever very viſible on them; it is of various length, from one inch to ſix or eight; its moſt frequent ſize, however, is about three inches in length, and one and a half in breadth, tho' often 'tis as broad as long. It is compos'd of flakes leſs emulating thoſe of the foliaceous Talcs than the former, from their thickneſs, and the coarſeneſs of the filaments that compoſe them; theſe are not collected into faſciæ, but are every where equally diſpos'd throughout the plates, and are conſiderably large and coarſe, and run ever obliquely acroſs the flakes that compoſe the maſs. Theſe flakes are very eaſily ſeparated from one another, but will not ſplit beyond a certain degree, which does not allow them any remarkable fineneſs; they will not be eaſily broken tranſverſely, but if bent longitudinally, they very readily break according to the direction of their fibres; they are but very little flexile, and not at all elaſtic, and of no great ſhare of brightneſs or tranſparence; they are not colourleſs like the former, but of a ſomewhat opake whitiſh hue; they are ſo ſoft as to be very eaſily ſcratch'd; and are conſiderably heavy.

It will neither give fire with ſteel, nor ferment with Aqua Fortis.

It calcines ſlowly, but to a perfect whiteneſs.

Examin'd by the Microſcope, it appears much brighter than to the naked eye, and is ſeen compos'd of a very beautiful and orderly arrangement of large parallel filaments.

It is extreamly common in Germany throughout almoſt the whole dominions; we have of it alſo in England, but leſs frequently; it is found lodg'd in the ſtrata of tile clay, as in Northamptonſhire and Leiceſterſhire.

SERIES III.

CLASS I. ORDER V. GENUS I.

CATHETOLIPES.

SELENITÆ *octohaedral, with perpendicular plates and obtuſe angles.*

We at preſent know only one Genus of this Order, and of that no more than one ſpecie.

1. *Cathetolipes albidus hebes.*
Dull whitiſh Cathetolipes.

This is a ſingular and very obſervable ſpecies; it is a regularly form'd and perfect body, and is ever in form of a ſegment of a depreſs'd hexangular column, compos'd of two horizontal planes, or a top and bottom, and four Trapezia, two on each ſide, divided by an obliquely plac'd, and ſcarcely diſtinguiſhable ridge; it riſing very little above the ſurface, and almoſt leaving the ſides in ſingle, inſtead of double Trapezia: It is ever ſhort and thick in proportion to its breadth; and is found from one ſixth of an inch long to two inches, but its moſt frequent ſtandard is ſomething leſs than an inch; with this it will often have half an inch of breadth, and not much leſs in thickneſs; its ends are truncated, but that not in the irregular manner of thoſe of the ordinary columnar Selenitæ, but are ſtruck off evenly tho' a little ſlanting, and leave two very ſmooth and perfectly gloſſy planes; theſe ends are in the ſtructure of this body anſwerable to the top and bottom of the ordinary columnar kinds; the ridge is not what it is in the others the extream edge of the largeſt or central plate of the maſs, but merely an angle form'd by the natural corner of the plates a little more acute than the reſt; and as the ſtructure of this body is ſo very different from, indeed contrary to that of all the reſt, the only wonder is, that there ſhould be any thing in it at all correſpondent to the ridge or limb of thoſe; the ſix planes, or as to keep up the analogy of figure between this and the other Selenitæ, they are call'd the top, bottom and Trapezia, are all form'd of the edges of the plates, but they are extreamly even and ſmooth, conſidering that, tho' not with the gloſs of the ends, or flat ſurfaces of the plates. It is compos'd of a vaſt number of tolerably thin flakes, laid evenly and regularly in a tranſverſe order, or perpendicularly to the length of the maſs; theſe are each compos'd of a conſiderable number of moderately large filaments, but thoſe ſo evenly diſpos'd as not to be diſtinguiſhable even to the Microſcope till the plate has been injur'd, and the texture of it broken by external force; the whole is eaſily fiſſile tranſverſely, or according to the direction of theſe flakes, tho' not according to the direction of the fibres that compoſe them without great force; the flakes are very flexile but not elaſtic, and not ſo ſoft or eaſily ſcratch'd as thoſe of many of the other kinds; they are of an opake, whitiſh hue in the maſs, but appear more pellucid and colourleſs when ſeparated.

The whole is moderately heavy, and will neither give fire with ſteel, nor ferment with Aqua Fortis.

It more ſlowly than any other Selenites, calcines to a whiteneſs.

Examin'd by the Microſcope, it appears compos'd of filaments of a moderate, or rather large ſize, not collected into faſciæ, but regularly diſtributed thro' the whole flake; ſo that on bending, or otherwiſe injuring its ſtructure, they become all diſplaced at the ſame time, and the whole flake equally white and opake.

It is found in ſome plenty in the Staffordſhire clay-pits, where they dig for clay for their earthen ware; I have alſo ſeen it among the loam-pits at Hedgerly, and Dr. Plot mentions its being found near Oxford.

SERIES III.

CLASS I. ORDER VI. GENUS I.

LEPASTRA.

SELENITÆ, compos'd of filaments, arrang'd toward the ſurface of the body into broader plates, notch'd at their edges, and diſpos'd in form of a radiated ſtar.

1. *Lepaſtrum lucidum, albido-fuſcum, ſquammis tenuioribus.*
Bright, browniſh white Lepaſtrum, with thinner flakes.

This is the moſt frequent of the bodies of this Genus, tho' even this is very rare; it has, however, been obſerv'd by ſome of our late ſearchers after foſſils, and becauſe found among the Septa of what they call'd the Ludus Helmontic, or Waxen Vein; the ſpecimens of the Septaria on which it happen'd to be affix'd, have been imagin'd a new ſpecies, and honour'd with the name of Ludus Helmontii Stellatus, the Starry Waxen Vein.

It is a moſt extreamly elegant, beautiful, and regularly figur'd body, and is ever found perfectly pure within, tho' ſometimes a little ſpotted externally toward the extremities of its flakes; and is never found affected by blemiſhes of any kind, or with the leaſt irregularities in its ſtructure.

It is ever found in form of a radiated ſtar, and on a ſlighter examination ſeems wholly compos'd of fine thin flakes propagated from one point, and running to very equal and regular diſtances, tho' not all to the ſame; the point from which theſe are propagated, is very rarely plac'd exactly in the center of the maſs; uſually it is near one of the edges, and the radiations or flakes being very ſhort there; gradually and regularly increaſe in length, as they approach the oppoſite ſide of the ſtar where they are longeſt of all, and thence as gradually and regularly decreaſe in length, as they approach the narrower rim: ſometimes they are all very nearly of the ſame length from the ſame point of the center; but more frequently while the larger and broader flakes keep up this regularity, there are a number of ſmaller of various lengths intermix'd among them, and making the whole a variouſly jagg'd and unequal ridge; ſometimes alſo the circle is carried round the whole circumference without interruption, but oftner there are notches and gaps in ſeveral parts, leaving the ſurface of the body to which it adheres naked between; in theſe, however, the flakes are as regularly diſpos'd as elſewhere, and the whole on the two ſides of the gap or notch, is perfectly regular, the ſame gradual ſhortning of the flakes being continued as if there had been no gap there, and looking as if it had been a notch cut by art.

The ſtars in this ſpecies are uſually broad and flat, having but little thickneſs in proportion to their extent, and being but little rais'd in the center from whence the flakes are propagated; it is of various dimenſions, from the extent of a barley corn's length to two inches in diameter; and appears externally to be compos'd wholly of a vaſt number of narrow and thin oblong flakes, plac'd vertically not horizontally, and covering the ſurface with ſharp but irregular and notch'd ridges; they are not, however, conſtant in this ſituation, but ſometimes are diſpos'd obliquely, and in ſome ſpecimens look as if they had ſuffer'd ſome external injury, and were cruſh'd almoſt flat.

The flakes are all thinner, finer, and laid more cloſely and regularly together, as they approach the center of the body, but as they go off from thence, they become thicker, and expand and open ſo as to form the larger circumference of the whole; theſe flakes are each a thin, flat, oblong, and obtuſely pointed body, they are broader near their extremities than in any other part, and have each regularly one deep notch on each ſide near the end, forming the top into the figure of a blunt ſpear point, and have all ſeveral ſmaller notches, like the teeth of a ſaw, plac'd all the way along both their edges as far as they can be trac'd; theſe are of a pale, whitiſh brown colour, and are frequently ſpotted with ſmall dots of black, or of duſky red.

This is the external appearance of this elegant body, but when broken, it ſhews a not leſs elegant and ſurprizing ſtructure; 'tis then ſeen to be compos'd of ſtrait, even, and very fine and ſlender longitudinal filaments, which departing from the centre in this ſimple form, make a maſs of a very elegantly ſtriated texture; and this is ever ſeen to be the caſe when the maſſes are broken, the whole ſeeming a ſolid and compact Nucleus of a finely ſtriated texture, cover'd with long narrow flakes; the origin of theſe, which are the only part of the body that offer themſelves to view exernally is from theſe fibres, which in the inner part conſtruct a ſimple ſolid maſs; but as they approach the ſurface, whether at the top or edges, they regularly form themſelves into thin and flat plates, or flakes, like thoſe of the other Selenitæ; it is a very pleaſing thing to obſerve in a broken ſpecimen of this body, the filaments, or ſimple ſtrait fibres arranging themſelves by degrees into theſe plates, or flakes; or they, as they approach the internal part of the maſs, looſing themſelves and falling into ſeparate fibres, and ſoon blending among the common matter; the body of the maſs is always fiſſile, according to the direction of the filaments; and the flakes are eaſily ſplit to any thinneſs, by the point of a fine knife carefully introduc'd next the middle of a newly broken ſpecimen; for on being expos'd to the air long, their ſubſtance become ſomewhat more brittle.

The plates are a little flexile when in thin pieces, but not at all elaſtic, the whole is very bright and gloſſy, and moderately tranſparent when examin'd in ſmall pieces; it is ſubject to no tinges ſo far as I have yet obſerv'd, but ſeems always of the ſame colour, a pale, whitiſh brown; it is moderately heavy, but of very little hardneſs; it may be eaſily ſcratch'd with the point of a knife, and breaks between the fingers; always ſplitting according to the direction of the plates and fibres, much more readily than breaking tranſverſely, and is eaſily crumbled into thin flat fragments, looking like flakes of Talc.

It will not give fire with ſteel.

It ferments not at all with Aqua Fortis.

In the fire it readily calcines to a pure white.

If the naked eye could from its ſtructure made up of filaments arrang'd into broad flakes, and thoſe fiſſile, flexile, and not elaſtic, and refuſing to ferment with acids, determinate this body to be a true Selenites, the Microſcope makes it much more evident, that it is truly ſo; examin'd with this aſſiſtance, its plates appear no way different from thoſe of the ordinary Selenitæ, being like them compos'd of a number of very fine and ſlender filaments, arrang'd into diſtinct faſciæ or bundles; and after a little bending, ſhewing their diſpoſition very plainly, ſome being hurt, and render'd opake, by their conſtituent filaments being diſturb'd in the bending, while others remain perfectly bright and pellucid: the faſciæ which compoſe theſe plates are all rang'd in the ſame longitudinal direction, and are not interſected by any tranſverſe lines; a thin piece of one of the flakes examin'd by the Microſcope, appears compos'd of a vaſt number of yet thinner flakes than thoſe of theſe faſciæ.

I know of only one place where this ſingular Foſſil is found, tho' probably it will hereafter be met with in others, this is the iſland of Sheppey in Kent; the ſpecimen Dr. Woodward had of it, and that preſented to the Muſæum of the Royal Society, by Sir Robert Moray, were both from this place. The accounts of Dr. Woodward and Grew, by no means agreeing as to the nature of the body; the one calling it a talky ſpar, and the other obſerving that it makes no efferveſcence with Acids; * which it muſt have done had it been a ſpar as Dr. Woodward calls it; and the Foſſil itſelf being ſo rare as to be preſerv'd in none of the cabinets of the modern Virtuoſi, engag'd me to make a journey while theſe ſheets were writing, to ſee it on the ſpot: I was ſo happy to ſucceed beyond expectation in the ſearch, having found and brought to London many ſpecimens of it: I found it there ever affix'd to the Septaria or Ludus Helmontii; ſometimes ſingly, ſometimes three, four, or more ſtars on the ſame ſpecimen; they are never affix'd to the ſubſtance of this ſtone, but always to the ſpar that form its Septa, and that never on the ſurface, but always in the inner parts where there are wide cracks between theſe Septa; and the ſtrata of clay in the cliff in which they lie, abound with Selenitæ of the common kinds. They are found only in one part of the iſland, which is under the high cliff that is about the middle portion of the ſeaward ſhore of the iſland, being at nearly equal diſtances from Sheerneſs, and the point of what they call Shelneſs, the farther part of the iſland; the cliff here riſes to a great perpendicular height, and runs I think for ſome miles along the ſhore; the ſea continually waſhes out of the ſtrata of clay, of which it is compos'd, vaſt quantities of many ſpecies of Septaria, which pave the ſhore in a manner not eaſily to be conceiv'd; and lie there with theſe ſtars on them among immenſe heaps of Pyritæ, Lapis Syringoides, in maſſes of many hundred weight; and multitudes of Foſſil ſhells of the Nautilus Græcorum, making the richeſt ſpot of ground for thoſe who delight in theſe ſtudies that I have ever met with.

Experiments made on the ſtars when I return'd, prove very plainly, that Dr. Woodward errs in imagining them talcy ſpars; ſince it is plain, that they contain no grain, either of talc or ſpar; and that Dr. Grew, tho' he had form'd no idea of what they really were, yet gave a very valuable and juſt account of them, when he ſaid they were of a quite different nature from the ſtone on which they grew, and made no efferveſcence with Acids; ſo much a better guide is truth and experiment than Hypotheſis.

2. *Lepaſtrum albidum, hebes, ſquammis, craſſioribus.*
White, dull-looking Lepaſtrum, with thick ſcales.

This is a body nearly related to the former, but of a conſiderably coarſer ſtructure, and of leſs beauty; it is of a ſomewhat conſiderably impure texture, compos'd of the ſame ſort of matter that forms the common Lepaſtrum, but debas'd by a conſiderably large admixture of a white ſubtile earth, and naturally running into a much coarſer maſs.

It is ſeldom, however, found ſpotted, or blotch'd with variouſly pure, or impure matter, but has its debaſing earth equally diffus'd thro' it in all parts; it is as regularly form'd and perfect a body as the former, and is ever found in the figure of a radiated ſtar, and compos'd of plates diverging from a central point; it is of various ſizes, from one tenth of an inch to an inch or more in diameter, and is always very thick, and rais'd high in the centre; its perpendicular diameter there, being uſually equal to its horizontal; it is ever compos'd of a vaſt number of conſiderably thick oblong plates, or flakes of various lengths, and but irregularly diſpos'd, the point from which they diverge is ſeldom in the centre, and they are of various, indeterminate and irregular extent, leaving numerous gaps and notches, ſome very large and deep; they are rang'd in different directions, but lie very cloſely upon one another; and are often placed vertically, but frequently lie ſo oblique as to appear almoſt horizontal: Some of the maſſes of this ſpecies quite loſe the form of ſtars by their extraordinary thickneſs; and might on a careleſs view be taken for Foſſil Echinitæ affix'd to the Septariæ.

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* Woodw. Vol. 1. p. 88. Sp. a 16. Grew's Muſ. p. 312.

The flakes of which the ſurfaces of theſe maſſes are compos'd, are very white, and conſiderably thick, and are notch'd much more deeply at their edges than thoſe of the former ſpecies, and end in very obtuſe and almoſt rounded points.

When the ſpecimens of this are broken, the whole inner part is found to be a ſolid maſs, not at all plated, or made up of flakes, but compos'd of numbers of conſiderably large and coarſe filaments, all running longitudinally from the central point toward the circumference; and every where as they approach the ſurface forming themſelves into theſe thick flakes.

It is of an opake whitiſh hue, ſeldom ting'd throughout to any other colour, but often ſpotted near the extremities of the flakes with black or deep red ſpecks, and ſometimes ting'd in part with a ferrugineous hue; it is of very little brightneſs, and is ſcarce at all tranſparent; it is moderately heavy, and of a conſiderable degree of hardneſs for a body of this Genus; it may, however, be broken between the fingers, and then does not eaſily ſeparate tranſverſely, but ſplits into ſomewhat thick flakes, which are a little flexile, but not at all elaſtic.

It will not give fire with ſteel.

It ferments not in the leaſt with Aqua Fortis.

It calcines ſlowly and imperfectly to a reddiſh white.

Examin'd by the Microſcope, its flakes all appear compos'd of filaments arrang'd cloſely and evenly together; theſe are conſiderably thick, and very eaſily diſtinguiſhable, and are not collected into any faſciæ, or bundles, but diſpos'd ſingly in the flakes; the central, or ſolid part, is much larger in this than in the former ſpecies, and the filaments are much coarſer in that part than in the flakes, theſe are alſo ſhorter than in the former, and the filaments may be trac'd all the way from the centre thro' the ſolid maſs, and ſo thro' all their lengths.

I found it with the former, under the cliffs of Sheppey iſland.

SERIES III.

CLASS I. ORDER VI. GENUS II.

TRICHESTRA.

SELENITÆ, *compos'd of filaments ſcarce viſibly arrang'd into plates, diſpos'd in form of a radiated ſtar, and appearing merely of a ſtriated texture.*

Of this Genus we have only one known ſpecies.

Tricheſtrum fuſcum, filamentis tenuibus.
Brown Tricheſtrum, with ſlender filaments.

This is a body extreamly approaching to thoſe of the preceding Genus; and differs from them only as one of the Genera of the columnar Selenitæ does from all the others, by having its filaments, which in the reſt are arrang'd into regular plates, or flakes, left looſe, or ſcarce viſibly arrang'd into any ſuch congeries.

It is a very beautiful Foſſil, of a perfectly pure, fine, and equal ſtructure, and never ſubject to blemiſhes, or foulneſs; but has ever its debaſing earth diffus'd thro' it in equal quantity, and giving it the ſame colour and ſame degree of purity throughout.

It is ever of a regular and determinate figure, always forming itſelf into the ſhape of a radiated ſtar, very flat, and thin in proportion to its breadth, and not compos'd of any viſible flakes by way of Radii, but of an almoſt infinite number of long, ſtrait, and very fine and ſlender parallel filaments.

It is found of various ſizes, from one tenth of an inch to near three inches in breadth, and tho' the broadeſt, and of the greateſt extent, is yet the thinneſt of all the bodies of this order; its largeſt ſpecimens ſeldom exceeding a quarter of an inch in thickneſs.

The fibres which make the Radii of this body, and of which it is wholly compos'd, are all propagated from the ſame point, from whence they diverge very equally to the circumference; they are very regular in their lengths; for tho' the point they run from is ſeldom in the centre of the body, but uſually inclin'd much to one ſide, the fibres that run from it, are all much of the ſame length, that go to the ſame part of circumference, and gradually and regularly ſhorten as they approach the ſhorter ſide; theſe are evidently the ſame ſort of bodies with thoſe which form the plates in the bodies of the other Genus of this order; but in this they always keep ſingle, and ſeparate in great part of their extent, and only here and there ſeem to arrange themſelves into a continu'd flat ſurface, and that only for a ſmall extent, and at different and irregular diſtances from the center, never making plates at the circumference, but always ending there in ſeparate filaments.

The filaments of which this whole body is compos'd, are extreamly fine and ſlender, and run longitudinally ſtrait from the center to the circumference without the leaſt bending; and there is no difference in this between the inner part of the maſs when broken, and its common outer ſurface.

It is of a ſomewhat deep duſky brown, but moderately bright, and in ſmall pieces tolerably pellucid; it is moderately heavy, but of no great hardneſs; it very readily ſplits according to the arrangements of its filaments, and is eaſily broken between the fingers into ſmall irregular congeries of them, but never gives any fragments of a plated or foliaceous texture; its fibres are ſcarce at all flexile, and not in the leaſt elaſtic.

It will not give fire with ſteel.

It ferments not at all with Aqua Fortis.

It very freely and readily calcines to a pale red.

Examin'd by the Microſcope, its filaments are ſeen arrang'd into ſmall faſciculi, rather flat than round, and ſhewing ſomething like flakes, eſpecially when they have been ſplit in breaking as is frequently the caſe.

I found it under the cliffs of Sheppey iſland, with the former kinds; they all appear to be genuine Selenitæ that have taken up a ſmall admixture of cryſtal, and more or leſs of a ſubtile earth at their formation, and this ſpecies ſeems to have more cryſtal and leſs earth than the reſt.

SERIES II.

CLASS I. ORDER VII. GENUS I.

SYMPLEXIA.

THE Selenitæ of all the Genera almoſt of all ſpecies indeed, are frequently found with other ſpecimens adhering to, or immers'd in their bodies; theſe, however, as has been before obſerv'd, are only to be accounted accidental varieties of the ſpecies, and by no means to be miſtaken as belonging to this order.

We at preſent know of this order one Genus only, and of that no more than two ſpecies; and theſe are, (as every one elſe, if any ſuch ſhould offer hereafter to be taken into it muſt be) complex maſſes, which have no one regular Selenites for their baſis, but are compos'd of the different ſpecies irregularly concreted together, and generally cruſh'd and hurt by one another, and thence render'd very imperfect in their figures.

1. *Symplexia pellucida, oblonga, marginibus ſerratis.*
Pellucid, oblong Symplexia, with notch'd edges.

This is ever a very irregularly form'd body, and that with ſo much variation from itſelf in the different ſpecimens, as not to be eaſily made the ſubject of a determinate deſcription; it is found uſually in form of an irregular column, of no certain number of ſides, but generally with two flat or horizontal ſurfaces; it has nothing of the limb or ridge ſo common among the Selenitæ of the other Genera, nor any planes that can with any degree of certainty be called either Rhombs or Trapezia: It is always long in proportion to its thickneſs, and uſually conſiderably broad. It is very irregularly and uncertainly tabulated in its various parts, ſome having perfectly ſmooth, and others very much ridg'd edges; nor is it to be omitted, that it is not unfrequently found in many places, with a tranſverſely ſtriated opake whitiſh cruſt, of one twelfth of an inch thick, or in ſome ſpecimens conſiderably more than that; the flat ſurfaces of its plates are extreamly bright and gloſſy, but it is very uncertain in what direction they are plac'd; the eye of the obſerver will, however, very eaſily diſcover them, and they will be found to be perfectly free from ridges, cavities, or while uninjur'd, even the leaſt appearance of ſtriæ. They are, however, compos'd of extreamly minute and ſlender parallel fibres, rang'd tranſverſely, and in an oblique direction, acroſs the plates, and the whole maſs has no appearance of the longitudinal ſeam, ſo frequent in the long ſhap'd Selenitæ, it being in reality not one body of that form, but a congeries of a great number of others, ſome longer, and others ſhorter, ſome columnar, and others Rhomboidal, very confuſedly and irregularly thrown together, and variouſly intrenching upon one another's ends and ſides, and injuring their figures; inſomuch, that it is rare to ſee any one perfect figure among a thouſand maſſes; the maſſes it is compos'd of are very different in ſize, and conſtitute accordingly ſpecimens of this complex body, of from half an inch, or leſs, to four, five or ſix inches in length. It is very eaſily fiſſile, but in various directions, and ſplits off into plates, not of its own ſize, but of that of each of the different maſſes; which, tho' they often join in the maſs, uſually ſeparate in their divided plates, the commiſſures of them appearing to have been but irregular, and their coherence very ſlight; theſe plates break like all the reſt, very readily in a tranſverſe direction, parallel to that of their fibres. The different maſſes that compoſe this body, are uſually more or leſs irregular and unevenly laid together; hence the edges of the complex body are notch'd and jagg'd, and very often the jaggs are ſo deep as to let in clay, the ſame of the ſtratum it lies in, quite to the center of the maſs. It is, however, in the whole, pretty firmly coherent, perfectly colourleſs and pellucid when pure, tho' often ting'd to a browniſh hue with clay; it is ſoft and eaſily ſcratch'd, like the reſt, and like the finer of them tolerably flexile in thin plates.

It is conſiderably heavy, and will neither give fire with ſteel, nor ferment with Aqua Fortis.

It burns to a fine opake white in a few minutes.

Examin'd by the Microſcope, its conſtituent flakes ſeem all of the ſame degree of fineneſs, and all compos'd exactly alike, of a multitude of very fine and ſlender filaments, rang'd in diſtinct faſciæ, and ſhewing themſelves, on bending the plates, in the form of broad, whitiſh and opake lines, among the pellucid and uninjur'd parts of the flake.

It is found in great abundance in the clay pits of Staffordſhire, Northamptonſhire, and Yorkſhire, and not unfrequently on the ſhores of the laſt county, but in thoſe places is uſually found much broken and damag'd.

2. *Symplexia albida, hebes, ſquammis, craſſiuſculis undulatis.* *Dull, whitiſh Symplexia, with thick tabulated flakes.*

This much approaches to the former in the general ſhape, as well as great irregularity of its complex ſubſtance, but is extreamly different from it in the conſtituent matter of its component maſſes. It is of no perfect or regular figure, but uſually affects an oblong form, and has not any thing that can be call'd either horizontal or lateral planes, but is abſolutely without all the characters of the more perfect Selenitæ, having neither top or bottom, ridge or longitudinal ſeam, nor Rhombs or Trapezia. It is uſually thick as well as long, and is of very irregularly, notch'd and ſcratch'd edges, and variouſly abrupt ends; the clay of the ſtratum being uſually let in, and that in conſiderable quantity between the component maſſes in all parts of it. Its component maſſes are, however, all of one texture, and all ſo very irregularly tabulated, that their ſeveral edges are in proportion as much rugged and notch'd, as that of the whole maſs;

their conſtituent flakes are conſiderably thick and coarſe, and are laid in ridges over one another, like the tiles of a houſe, and uſually undulated and inflected in moſt of the maſſes. The compound maſs is of very various ſizes, in proportion to the bigneſs of the bodies of which it is compos'd; and is found from leſs than an inch to ſix inches in length, and is uſually half as much in diameter, as in length. Its conſtituent maſſes are all compos'd of plates of conſiderable thickneſs, of rough, uneven ſurfaces, the flakes being often broken, and irregularly imperfect, and ſubject to viſible ſtriæ, from the range of the filaments they are compos'd of, which are very thick and large, and run in an oblique direction acroſs them. They ſplit and ſeparate from one another with great eaſe, and when ſeparated break with equal eaſe tranſverſely, according to the direction and range of the filaments; but they are very little flexile, and not at all elaſtic; they are of a dull, opake whitiſh colour, and of ſome faint degree of brightneſs, but have but very little tranſparence; the whole maſs is of moderate weight, and is ſoft and eaſily ſcratch'd.

It will neither give fire with ſteel, nor ferment with Aqua Fortis.

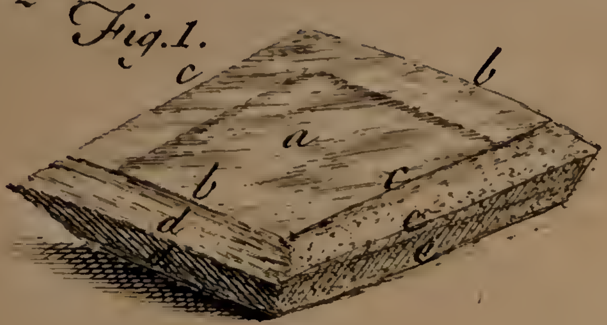
It calcines more ſlowly than almoſt any other ſpecies.

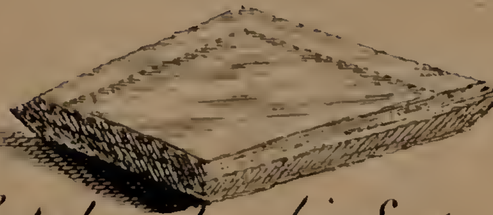
Examin'd by the Microſcope, the flakes appear compos'd of very diſtinct and viſible filaments, and thoſe rang'd equally thro' the whole ſubſtance of them, and not collected into faſciæ, as is often the caſe; but when a flake is cruſh'd or bent, ſhewing themſelves equally diſplac'd throughout, and making the whole alike opake.

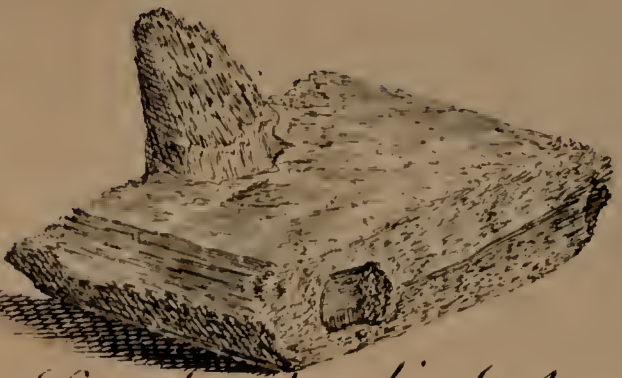
No one of the ſmaller maſſes that compoſe this ſpecies are ever found perfect, or entirely regularly form'd; 'tis therefore owing to a congeries of theſe brought together, while yet in the act of formation, and deſerted by the ambient fluid, in which alone they could have perfected their form and figure, at a time when they had but begun to aſſume it, that this and the other complex ſpecies owe their origin; the maſſes, tho' imperfect, are evidently all of the ſame ſtructure in each, and their degree of coheſion, which is much the ſame in all, ſhews they were in this ſtate while brought together.

It is found in the clay pits of Yorkſhire, and in no other part of the kingdom, ſo far as I have yet heard; this, as well as the reſt, is liable to be ſtain'd, ſpotted, and clouded with clay; and in ſome maſſes of this, it is common to ſee the ends of the component maſſes that ſtand ſeparate, inflected toward the maſs, and all their plates regularly bent over one another. This muſt have happen'd while they were very ſoft and moiſt, for they ſeem to have ſuſtain'd no injury by it.

Fig. 1.




Leptodecarhombis Sp.1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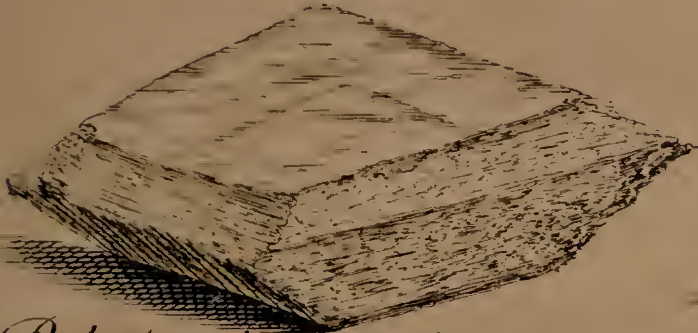
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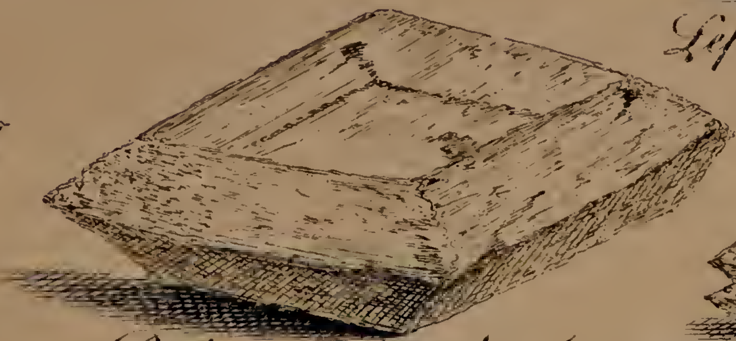
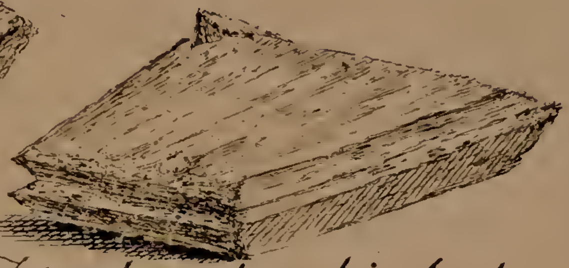
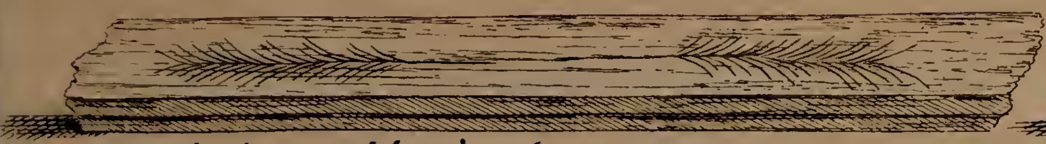

Pachodecarhombis Sp.3


Tetradecarhombis Sp.1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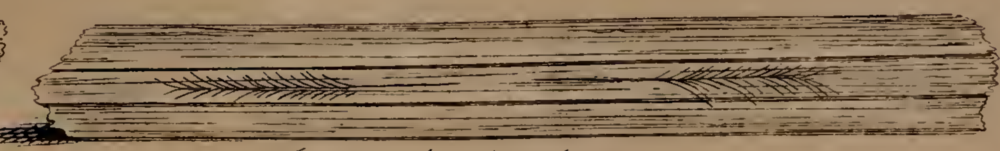
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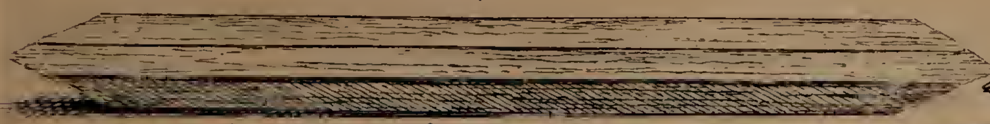
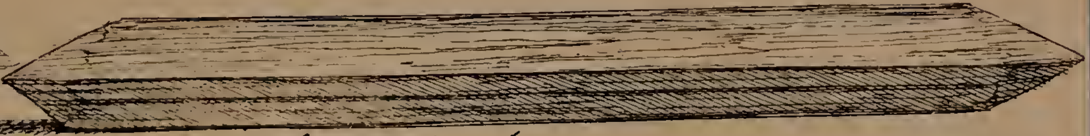

Oxucia Sp.1.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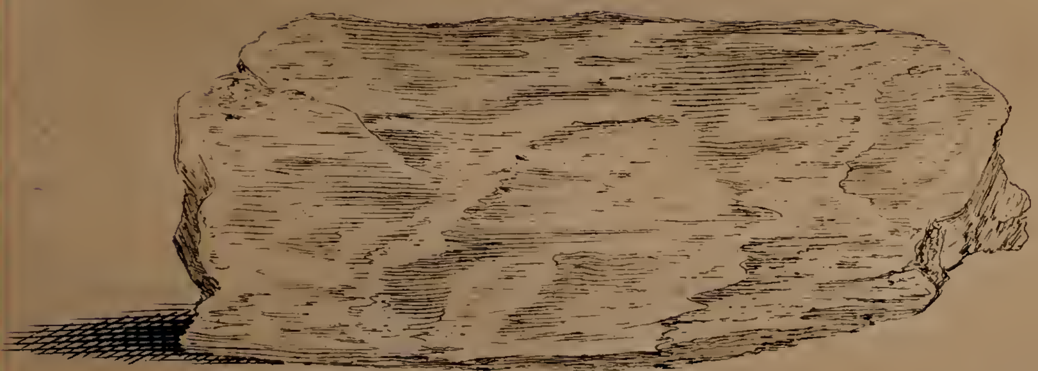
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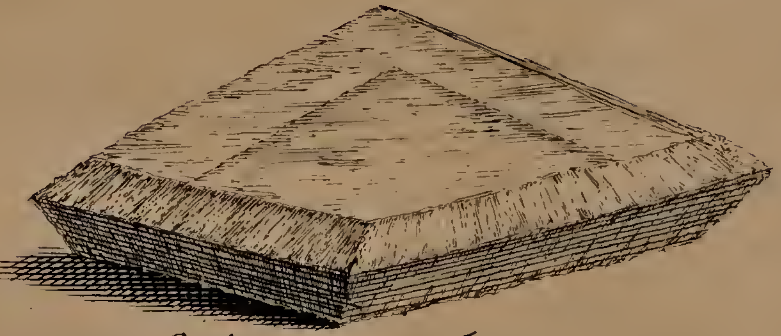
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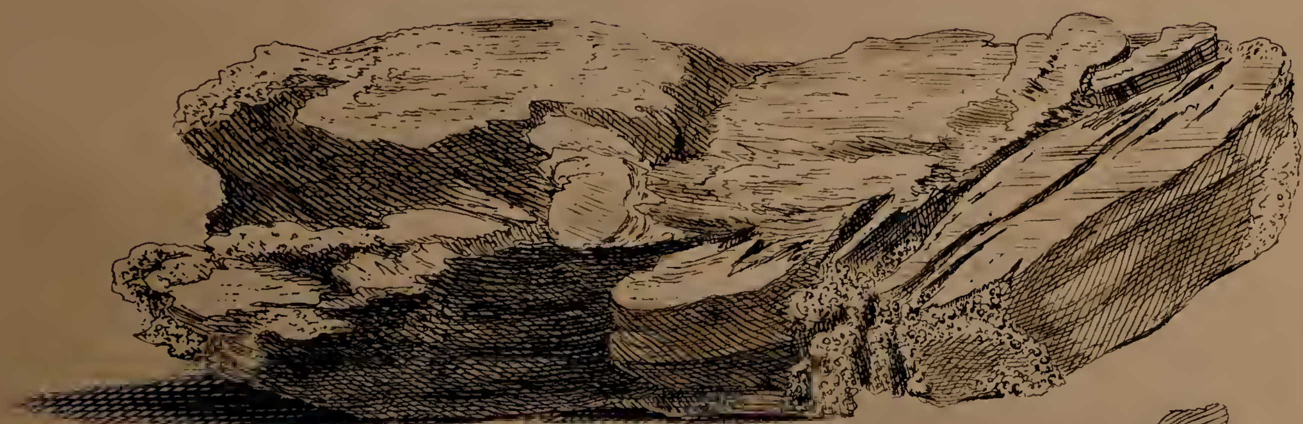
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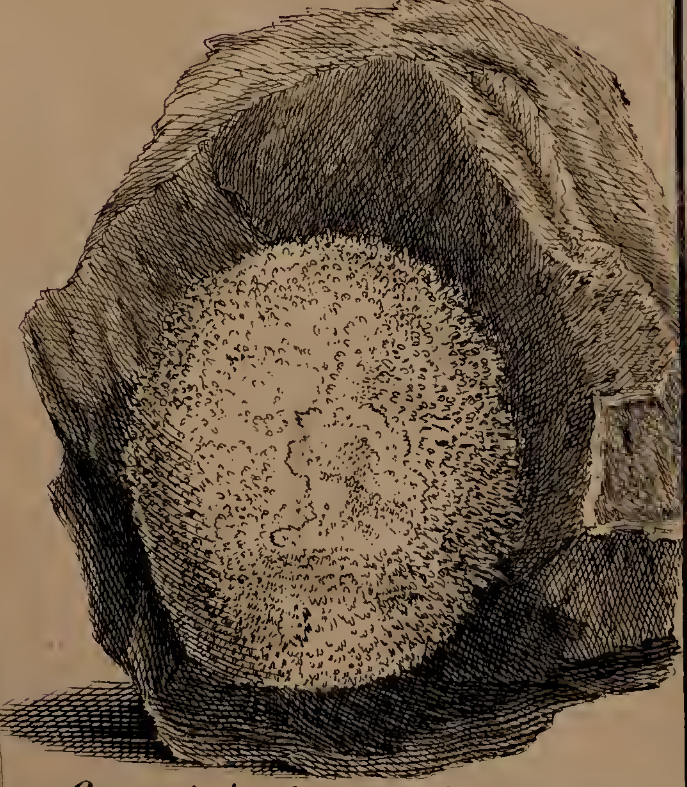
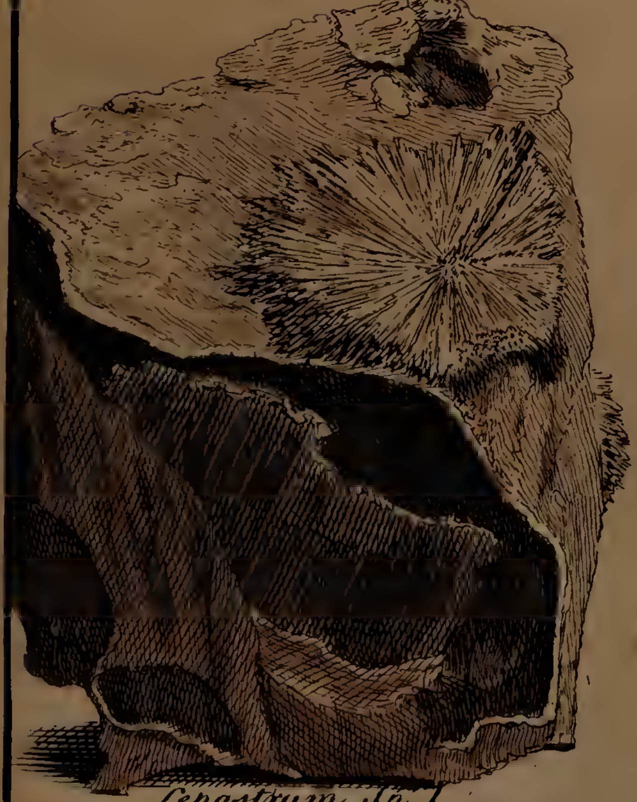

Lepastri Sp.2. Varietas Craſsior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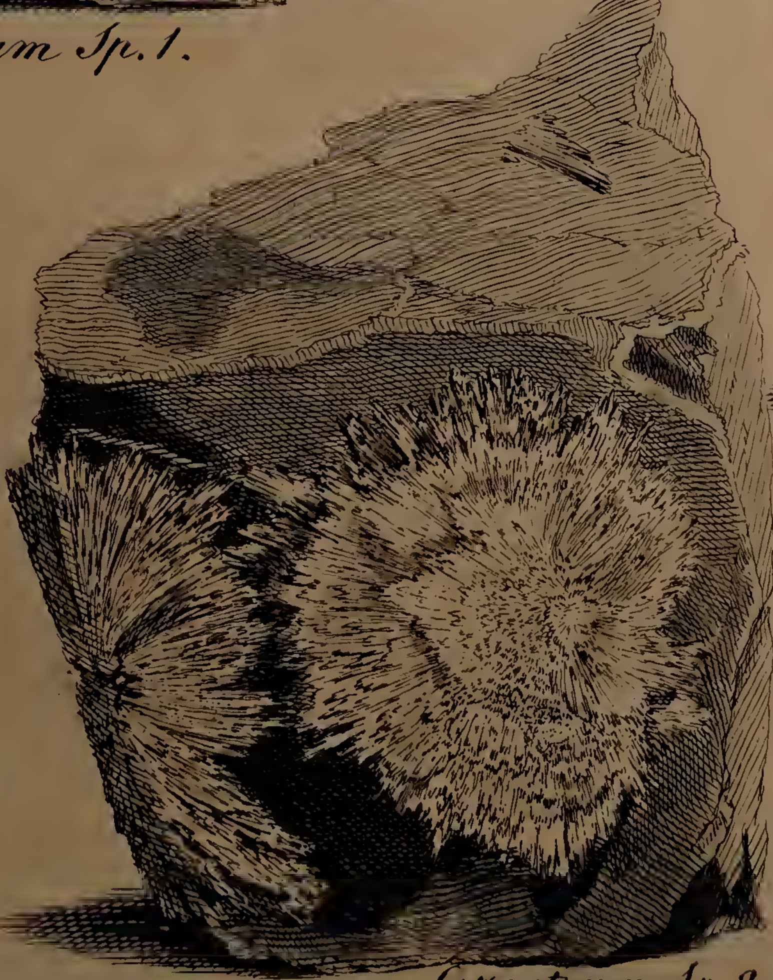
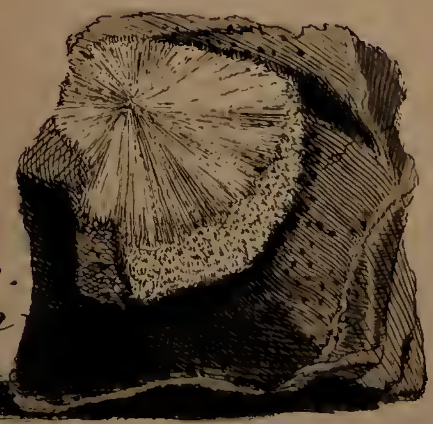

Lepastrum Sp.2.


Trichestrum

B. Cole Sculp.

FOSSILS

NATURALLY and eſſentially ſimple, not inflammable nor ſoluble in water, of a regular ſtructure, and determinate figure.

Series the third.

Claſs the ſecond.

CRYSTALS.

Hard, pellucid and naturally colourleſs bodies, of regularly angular figures, compos'd of ſimple, not filamentous plates, not flexile or elaſtic, giving fire with ſteel, not fermenting with Acid Menſtrua, and calcining in a ſtrong fire.

Of this Claſs there are three Orders, and under thoſe nine Genera.

Order the firſt.

Perfect columnar Cryſtals, with double pyramids, compos'd of eighteen planes, in an hexangular column, terminated by an hexangular pyramid at each end.

Order the ſecond.

Perfect Cryſtals, with double pyramids, without a column, compos'd either of twelve, or of ſixteen planes, in two hexangular pyramids, join'd cloſely baſe to baſe, without the intervention of any column.

Order the third.

Imperfect Cryſtals, with ſingle pyramids, compos'd either of twelve, or of ten planes, in an hexangular or pentangular column, affix'd irregularly at one end to ſome ſolid body, and terminated at the other by an hexangular or pentangular pyramid.

CRYSTALS.

Order the firſt.

Genus 1. MACROTELOSTYLA. *Cryſtals with a longer intermediate column.*

Genus 2. BRACHYTELOSTYLA. *Cryſtals with a ſhorter intermediate column.*

CRYSTALS.

Order the ſecond.

Genus 1. PAURAEDRASTYLA. *Dodecahaedral Cryſtals, compos'd of two hexangular pyramids, join'd baſe to baſe, without an intermediate column.*

Genus 2. POLÆDRASTYLA. *Hexadecahaedral Cryſtals, compos'd of two octangular pyramids, join'd baſe to baſe, without an intermediate column.*

CRYSTALS.

Order the third.

Genus 1. ELLIPOMACROSTYLA. *Dodecahaedral Cryſtals, with thin hexangular columns terminated by hexangular pyramids.*

Genus 2. ELLIPOPACHYSTYLA. *Dodecahaedral Cryſtals, with thick hexangular columns, terminated by hexangular pyramids.*

Genus 3. OLIGAEDRA. *Decahaedral Cryſtals, with thick pentangular columns, terminated by pentangular pyramids.*

Genus 4. PANGONIA. *Tetreicoſihaedral Cryſtals, compos'd of dodecangular columns, terminated by dodecangular pyramids.*

Genus 5. ARTHRODIA. *Dodecahaedral Cryſtals, with very ſhort and ſlender columns, and moderately long pyramids, generally found cluſter'd together on the ſurface of cryſtalline, or ſtony roundiſh nodules, or encruſting cavities within ſuch, and call'd by Dr. Woodward echinated and concave cryſtalline balls.*

Adding to theſe regular Genera, the accidental varieties of cryſtal, owing to the admixture of metalline particles, influencing their ſhape as well as colour, the three principal of which are the lead, iron and tin impregnated ones, the firſt Cubic, the ſecond Rhomboidal, and the laſt quadrilateral Pyramids, we have the whole ſeries of the figur'd Cryſtals.

APPENDIX to CLASS II.

Order the firſt.

Cubic Cryſtals, influenc'd in their figures by lead. MOLYBDIA.

Order the ſecond.

Pyramidal, with four planes, influenc'd by Tin. CASSITERIA.

Order the third.

Rhomboidal influenc'd by iron. SIDERIA.

Of CRYSTAL in General.

AS the well knowing this Foſſil is of great conſequence to the underſtanding multitudes of others of which it is the baſis: It may not be improper, before we enter on the enumeration of the ſpecies, to conſider the body in general ſomewhat at large, in regard to its origin and formation.

Cryſtal is moſt uſually found conſiſting either of eighteen ſides, diſpos'd in form of an hexangular column, terminated by an hexangular pyramid at each end; or in a columnar dodecahaedral form, from one of the pyramids being obliterated by the application and coheſion of one end of the cryſtal to a ſolid body.

Cryſtals found naturally looſe, are uſually double pointed and regular octodecahaedrons; thoſe found affix'd to ſtone, uſually regular dodecahaedrons, from the want of one pyramid; and their many other leſs common figures have been mention'd in the characters of their ſeveral Genera.

But beſide theſe, Cryſtal is frequently found in a pebble-like form, of a roundiſh figure, and abſolutely without angles. The bodies of this form have been already deſcrib'd in their proper place, and are merely accidental varieties in the concretion of the ſame cryſtal, and we find in like manner that the moſt regularly figur'd of all bodies, the ſalts, are capable of aſſuming different and irregular forms, ſince ſea ſalt naturally concretes according to the quicker or ſlower evaporation of the water in which it has been diſſolv'd, either into cubic, pyramidal, or parallellopiped Cryſtals; and in many parts of the world is found in none of all theſe forms, but conſtituting whole ſhapeleſs rocks, and even immenſe ſtrata: And it is as certain, that Cryſtal in the pebble form, if we were ſo happy as to know a diſſolvent for it, wou'd cryſtallize afterwards where looſe, into octodecahaedral double pointed columns; and where affix'd to the ſides of the veſſel into dodecahaedral ſingle pointed ones; as that the different Cryſtals of ſalt, and the rocks of Sal Gemm, are all in reality the ſame ſubſtance; all diſſolve in exactly the ſame quantity of water, that is, a little more than three times their own weight; and after ſolution, all produce, if evaporated in the ſame manner, the ſame Cryſtals.

The origin and formation of cryſtal, as to the time and manner of them, have been attempted to be accounted for in various ways, by a multitude of authors, many of them of great note, and famous for their knowledge in the operations of nature, but no ſatisfactory account has yet been given.

The manner of formation of this body, is a ſubject of great uſe in the determining its true hiſtory, and reducing its various kinds into proper Genera. But the time of its concretion, if that be any way to be aſcertained, and the great queſtion anſwer'd, Whether it were all form'd at one time, and that long ſince, or does continue to be form'd to this day, is a matter of yet much greater importance in the Foſſil hiſtory, ſince on it depends the aſcertaining the time of the coaleſcence of many other bodies.

Many of the more compound Foſſil bodies, are form'd principally of Cryſtal, or Spar, or both; the original coaleſcence and formation of thoſe where Spar alone is the baſis, we well know may have been but of yeſterday, ſince we have evident proofs that Spar is concreting to this day, and ſparry bodies are form'd every moment; by the ſparry Stalactitæ in the arches of modern buildings, ſo late a one as the new bridge here at Weſtminſter not excepted, whoſe arches are already well hung with theſe bodies; nay, and we know that they are not form'd of matter educ'd from the ſtone of theſe buildings, but abſolutely rais'd in effluvia, ſince we find them in brick vaults: A moſt memorable inſtance of which was this year given us, in the opening the brick vault or arch which ſupports part of the terrace of Windſor Caſtle, the top, bottom and ſides of which were all ſo full of Stalactitæ, that there was not room to walk for them; theſe were form'd of a Cryſtallino-terrene, or terrene Spa, and ſome of them were four feet long.

From this, and from the incruſtations of Spar, and a calcarious earth, daily made on vegetables in ſome ſprings; there is no doubt, but that ſparry bodies may be, and are conſtantly form'd to this day; but we have no ſuch clear evidence of the preſent formation of cryſtals.

As very much of the hiſtory of the Foſſil world, depends on the determination of this great queſtion, whether cryſtal is, or is not form'd, and cryſtalline bodies produc'd at this day: It is aſſuredly one of the worthieſt ſubjects of enquiry, that this extenſive province can afford us, and a few certain and indiſputable propoſitions will lead us to the proper ſubject and road of enquiry, and to determine it by the only certain teſt, experiment.

If Cryſtal and Spar can be at this day diſſolv'd in water, or ſuſpended in it, in their minima or ultimate particles, and again ſeparated from it, then ſtony or other Foſſils, compounded of Spar and Cryſtal, may be form'd at this day: if theſe bodies are not thus diſſolv'd, they cannot.

If Cryſtal and Spar can be rais'd in vapour, or ſuſpended in effluvia, then cryſtalline and ſparry concretions may at this day be form'd in places, where water cannot be ſuppos'd to have come. If they cannot be thus ſuſpended, Cryſtals and Spars cannot be at this time form'd in ſuch places; but have, and muſt have been there from ſome diſtant time.

The ſubject of enquiry is by theſe propoſitions reduc'd into a narrow compaſs, and all that experiments have to determine is, whether Cryſtal and Spar are at this time found ſuſpended in imperceptible particles in water, or whether they are not?

And whether, if they are, they be or be not capable of being rais'd in vapour?

Theſe things I have been at the pains of attempting to know by a multitude of experiments; and as facts are ſtubborn and unanſwerable things, ſhall not be afraid of advancing upon them the doctrines they will warrant.

The bottom and ſide of every tea-kettle, will inform us, that ſome ſolid Foſſil body is contain'd in all, even the pureſt and cleareſt water, and is eaſily ſeparated from it by no other agent than heat; and as we yet know of no ſubſtance, and perhaps there is in nature none capable of precipitating this ſubſtance from the water, and heat alone can do it ſo eaſily; heat, and not admixture of other matter, is the moſt natural means for us to uſe in the inveſtigation of this ſubject.

The ſtony ſubſtance form'd in tea-kettles, and other veſſels in which water has been boil'd, is ever perfectly like that depoſited by the water of ſome ſprings in their current, encruſting plants and other ſubſtances, put into, or accidentally lying in it; and is either form'd into plates, ſingle, double, triple, or quadruple, exactly like thoſe on the ſides of the fiſſures of ſtone, or into congeries of very beautiful Tubera or efflo-reſcences; water over ſated with theſe ſubſtances therefore, will naturally depoſit them, water leſs ſated with them requires heat to aſſiſt it by evaporation.

Both theſe inſtances are proofs, that ſolid matter is inviſibly ſuſpended in all water; but this ſubſtance carefully examin'd according to the known properties of Foſſils, proves to be abſolute Spar, with an extreamly ſmall quantity of a dead Earth.

It very freely calcines in the fire.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis, and is almoſt wholly diſſolv'd by it.

The experiment indeed is very ſingular and entertaining, for after a violent fermentation and motion in the Menſtruum, the whole maſs put in, is found diſſolv'd without any precipitation; and the extream ſmall portion of earth it contain'd, is ſeen ſwimming in it in form of an inconceivably thin film, but exactly of the ſhape of the maſs it belong'd to, and with all its notches, irregularities and angles.

A quantity of theſe films taken out and examin'd, prove a mere blueiſh or yellow clay.

Here therefore is a proof, that Spar and a little Earth may be ſuſtain'd in water, and that ſparry concretions are and may be form'd to this day; here, however, is yet no appearance of cryſtal.

To examine more accurately the contents of water, I order'd a veſſel to be made for a nice diſtillation of it; this was a glaſs cucurbite, of three foot in length, with a large glaſs head; water from various ſprings being diſtill'd in this veſſel with a ſlow fire in a ſand heat, afforded ſuch different quantities of this ſtony matter as are ſcarce to be conceiv'd; in diſtilling the water of the ſame ſpring alſo at different times, and with very different degrees of fire, I found that I procur'd very different quantities of this ſtony matter; and that exactly according to the degree of fire, the ſtrongeſt always affording the ſmalleſt quantity of ſediment, the ſloweſt fire the greateſt.

It appear'd therefore, that in the greater degree of heat, a great part of the ſtony matter had been carry'd off with the vapour.

Having examin'd the various Reſiduums of the different waters, and different operations, all appear'd to be Spar, loaded with more or leſs earth, tho' none with more than enough to form the films before deſcrib'd; no ſediment, or undiſſolv'd matter appearing in any of the experiments.

The different weight of the Reſiduum of the ſame quantity of the ſame water, work'd with different degrees of fire, was in ſome experiments as one ſixteenth only to one; hence it is evident, a great part of the ſtony matter contain'd in the water, was, in the diſtillations made with greater fire, carry'd off.

Both the queſtions therefore are determin'd in the affirmative, in regard to Spar, by theſe experiments; and it is evident, that it can be both imperceptibly ſuſpended in water, and rais'd in vapour or effluvia.

To inveſtigate this ſubject with the greater certainty, I now, after having clean waſh'd the cucurbite, pour'd back into it the water diſtill'd from one of thoſe quantities whence leaſt Spar had been ſeparated; that is, one which had been driven over with the greateſt fire; working this with as gentle a heat as would juſt drive it over, I found at the bottom of the cucurbite, a Reſiduum, ſmall in quantity, and of a whiter colour than uſual, and carefully taking out, by means of an iron ſcoop at the end of a ſtick, I proceeded to examine it by the Aqua Fortis.

This Reſiduum fermented but very languidly with the Acid, was very long in diſſolving, left no film, or earthy ſkin floating in the Menſtruum; but inſtead of it, a ſmall quantity of a whitiſh powder remain'd unaffected by the menſtruum at the bottom of the cup; this experiment I was oblig'd to repeat three ſeveral times, in which it always ſucceeded conſtantly alike, in order to get a quantity of this whitiſh powder ſufficient to preſerve and experiment upon, which being waſh'd from the Acid, and carefully dry'd, had, as far as is poſſible to try it, all the properties of true Cryſtal; and appears to the Microſcope, and to all other trials after calcination, the very ſame thing with calcin'd Cryſtal.

Willing to proſecute this inveſtigation to the utmoſt, I a third time diſtill'd the water the former Reſiduum was pour'd from, but muſt acknowledge that I now obtain'd not the leaſt appearance of a Reſiduum, tho' the fire was as ſlow as could be made to work it over.

Here, however, was an abſolute determination of the great point in debate, and which, for want of patience and application to make ſuch an analyſis of water, never has before been, nor without it ever could have been procur'd; and it is evident, that Cryſtal as well as Spar, can be, and continually is, both ſuſpended in water, and rais'd in form of vapour; and conſequently, that ſtones and minerals form'd of Cryſtal and Spar, need not be ſuppos'd all of them as old as the creation or deluge, but may be and unqueſtionably are form'd to this day.

The application of theſe obſervations, will be naturally in our way in the hiſtories of the ſeveral ſpecies.

I have only to obſerve, that the heat of diſtillation having been too violent to ſuffer the cryſtalline matter to form itſelf into regular concretions; and ſome experiments on the ſolutions of copper, made long time ſince, having inform'd me, that an extreamly gentle heat and ſlow evaporation, will often afford regular cryſtals from ſolutions, that no other art can procure them from; I have ſet the pure diſtill'd water from the ſpring in Hyde-Park, the ſame from which I obtain'd the cryſtalline ſediment, and work'd in the ſame manner, to an evaporation that will take a long time; but the ſucceſs of which I ſhall be able to give, if it have any, before the finiſhing of the working off theſe ſheets.

As it is very cuſtomary in chymical reſearches, while one is labouring after one thing to diſcover another; the reader will pardon me a ſhort digreſſion, in regard to the much celebrated and generally credited experiment, of converting water to earth by repeated diſtillations: I am ſenſible that the thing has been reported to have been tried, and believ'd by the beſt chymiſts; but from the few trials I have made of water on this occaſion, the utmoſt of which went no farther than to a third diſtillation, I am well aſſur'd the proceſs is impracticable. Theſe gentlemen of ſanguine imaginations have deceiv'd themſelves, by ſeeing a ſolid matter ſeparated from water by diſtillation, and that increas'd in quantity on a once repeated diſtillation, and have gone no farther; but concluded, that as the ſpot of earth, as they call'd it, in the bottom of the cucurbite encreas'd in quantity at the ſecond operation, it muſt continue to do ſo till the whole was earth. They have dealt unfairly with the world in repeating as experimented facts their own conjectures; for the experiments I have gone thro' on this occaſion, have proved to me, that no part of the water is in theſe proceſſes at all converted into earth, but that a ſmall quantity only of ſtony matter ſuſpended in the water is thus ſeparated from it; and that after a ſecond diſtillation carefully and properly made, no more ſolid matter can be procur'd from the water, nor the ſpot at the bottom of the cucurbite ever encreaſe a grain in weight.

Of the formation of Cryſtal.

Having thus from experiments gone thro' the hiſtory of what may be the origin of many of the cryſtalline bodies we daily meet with, it remains to ſay ſomething of their form: The perfect regularity of the figures of the different Genera of cryſtal, when they have had the proper accidents attending their formation, cannot but be the effect of ſome fix'd, permanent and invariable cauſe; what that cauſe ſhould be has long exercis'd the talents of the learned and curious obſervers, but the variety of their opinions in regard to it cannot but create great confuſion in the minds of their Readers.

The antients eſteem'd it a congelation of water by extream cold, and thought it only ice harder than ordinary. Signior Lana, who at the *Val Sabbia* had had an opportunity of ſeeing ſome of the more perfect kinds, or double pointed cryſtals, imagines them to owe their origin to the dews congeal'd by means of nitrous exhalations: Rohault imagines the figure of common Cryſtal the natural form of ſix drops of water thrown together,

gether, and that therefore ſix round globules of fluid cryſtalline matter meeting together, might naturally coaleſce into this form; others are for its being form'd by radiations, others from the figures of all its parts being like the whole, others from the mutual tendency of the parts of it toward the ſame centre; all which the laws of action in matter, and the obſervations of the ſtructure of Cryſtal in the accounts of the ſpecies, will ſhew to be trifling and erroneous.

The vulgar think they have clear'd all difficulties about it, by declaring it to be a ſalt, not conſidering that even then we are as far to ſeek as ever, ſeeing that notwithſtanding all that has been ſaid, we are as far from knowing the true cauſe of the figures of ſalts, as of thoſe of Cryſtal; and that if Cryſtals are ſalts, then ſalts are ſomething elſe from what we have been taught to think they are; and conſequently that we muſt form ſome new idea of ſalts before we can range Cryſtal among them. We have no where to take our definitions of theſe things from, but the works of the chymiſts and naturaliſts; the lateſt and moſt celebrated of which, Boerhaave and Geoffroy, have given us definitions of ſalts that muſt for ever exclude Cryſtal from among them; the former defines ſalts to be foſſile bodies, which will melt both in fire and water, and are of ſo ſimple a ſtructure, that each particle retains the ſame nature with the whole, and impreſſes a ſenſe of taſte on the tongue; and the other, that they are ſolid, friable, pellucid, mineral bodies, readily ſoluble in water, running in the fire, and readily concreting into cryſtalline forms.

It is very evident, that if ſalts are ſuch things as theſe, Cryſtals can be none of them; but as we at preſent ſo little underſtand from what principle, or by what power it is, that ſalts are determin'd to theſe figures in their ſmalleſt concretions; why are we to determine, that no other bodies but ſalts can have that power, or principle: certainly the ſame Almighty agent, who has implanted in the minima of ſaline bodies, a tendency to theſe their appropriate and ſeveral forms; and that ſo ſtrong, that in the natural ſtate of things, and with the appropriated accidents, it never fails of taking effect; could with equal eaſe allot the ſame tendency to other bodies as well as to ſalts, and evidently has done ſo; and Cryſtals, Spars, the regularly figur'd Pyritæ, &c. are inſtances of it.

I obſerve, that it is unknown to us how it is that theſe bodies in their ſmalleſt concretions obtain theſe determinate forms; how they are enlarg'd afterwards, I flatter myſelf is not beyond our reſearches; but from an accurate obſervation of the bodies themſelves when thus enlarg'd, may be with ſome degree of certainty determin'd.

We are not to doubt, but that the ſmalleſt concretions of cryſtal are ever in form of what we ſee them when larger; ſince the ſmalleſt our eyes can diſcover, or even the help of the Microſcope detect in the cracks and vacuities of other bodies, are ever as determinately form'd and regularly ſhap'd as the largeſt; if affix'd to other bodies, they are all columns regularly hexangular, and terminated by pyramids at their tops; and if looſe, they end in pyramids both ways, with longer or ſhorter columns according to their kind.

Be it granted then, that cryſtalline matter is univerſally ſuſpended in water, and even in vapour, and waits only the proper evaporation of that water or vapour to concrete; and that its ſmalleſt and original concretions neceſſarily are in the regular form the body is afterwards to appear in: we find water, with cryſtalline matter thus ſuſpended in it, lodg'd in ſmall cavities of ſtone, the crevices of hard bodies, and other ſuch places where it has reſt, and a ſlow evaporation of the water, the only accidents neceſſary to the regular arrangements of its parts.

This cryſtalline matter, while ſuſpended in a vaſt proportion of water, tho' when collected into a body it be of more than twice the ſpecific gravity of that water, yet while thus ſeparate and diffus'd in it, it attracts the particles of the water more ſtrongly than they do mutually one another; and all the particles of Cryſtal thus alſo attracting water more than one another, muſt give way to that repulſive power, as it is called, properly the effect of another attraction, by which all things are made to aſcend in water, which are leſs than water attracted by the gravitating power of the earth; and the particles of this Cryſtal therefore attracting the particles of water more ſtrongly than one another, recede from one another, and are kept at as great diſtances as the quantity of water they are ſuſpended in will permit.

When this quantity of water is gradually leſſened ſo far by the evaporation effected by the ſubterraneous heats, that the particles of ſuſpended Cryſtal, which by reaſon of the extream ſmall degree of heat could not riſe up with the vapour, but remain the ſame in quantity in leſs water, are brought within the verge of the attraction of one another, and neceſſarily are now more ſtrongly attracted by one another, than by the particles of water; it follows, that they form concretions; this they uſually do in many parts of the fluid at once, and many regular columns with ſingle or double pyramidal ends are form'd: hence the number of cryſtalline ſhoots and nodules uſually found together; if the ſame law continued now in force, the whole cryſtalline matter muſt thus form itſelf into extreamly minute cryſtals; the aggregation of which, whatever may have been imagin'd, would never have the effect of making the regular cryſtals we ſee; but this is not the caſe, here is now a new power eſtabliſh'd in the evaporating fluid, here are bodies aggregates of particles tho' ſmall, already form'd, and the floating particles of cryſtal, being as it is well known from the laws of attraction, that they muſt be, more attracted by theſe already form'd maſſes, than either by the particles of the water, or by one another, they are all determin'd to theſe, and fall in ſmall congeries upon them; theſe additions of freſh cryſtalline matter to the already form'd ſprigs of Cryſtal, would remain in lumps, knots, and irregular protuberances on them, were it not for the preſſure of the medium, but by this action of the ambient fluid, they are dilated and ſpread over the already form'd maſs with perfect equality, and therefore can never alter its form; but if a thouſand ſucceſſive applications of this kind are made, and all thus equally dilated over the whole ſurface, they can only continue to add to the ſize of the body without at all altering its figure.

Nor let this appear conjecture merely, for ſometimes from the too haſty evaporation of the water there are in reality theſe irregularities, bunches and protuberances, and ſometimes even holes from the defect of the diffuſion over the whole ſurface; theſe holes frequently contain water which is viſible to the eye, tho' encloſ'd in many plates afterwards added; and in the preſent ſtate of the Cryſtal, perhaps near its center.

As the encreaſe in bulk in already form'd Cryſtal, while in the fluid it was form'd in, is plainly then from additions of new cryſtalline matter, which had in the ſame manner been before floating in the fluid; but which, the fluid now being from want of a proper proportion, incapable of ſuſtaining any longer, muſt concrete, and is by the univerſal laws of attraction, determin'd to affix itſelf to this already form'd cryſtal, not to make a ſeparate concretion; its particles being now more attracted by this Cryſtal, than either by the water, or by one another; ſo there is this farther obſervable, that this attraction is determin'd principally to one part of the already form'd Cryſtal, which is its pyramidal end or ends: in theſe the power of attraction, while in this ſtate, ſeems much ſtronger than in any other part of the body; and to theſe all the new matter, as far as we can judge from what we diſcover in the preſent ſtate of Cryſtal, ſeems to have been added: this alſo has not been added equally to all, nor are all of an equal breadth; from theſe the added matter is ſpread, dilated, and driven down the column ſo far as it can reach; hence the planes of the pyramids, and their columnar ones, are often ſome larger than others; and from the frequent new addition of matter thus dilated and driven down the column to different lengths, ariſe the frequent tranſverſe lines on the columnar planes, even of the ſmootheſt Cryſtals, which in ſome of the larger and coarſer columns, may be plainly diſcover'd to be no other than the edges of ſo many ſtrata, or thin cruſts of cryſtalline matter laid over one another; and ſuch they really are (tho' not ſo eaſily diſtinguiſhable) in all Cryſtals, even the fineſt.

The top, or pyramidal planes have none of theſe lines, nor any other mark; the matter added having ever been ſpread firſt, and therefore moſt perfectly over them, and terminating where its hardneſs would ſuffer it to go no farther on the column; to this ſtructure is owing alſo the preſerving of drops of water in cryſtals, which is another inconteſtible proof that ſuch cryſtals have been form'd in water; one of their coats, or one diffuſion of a quantity of cryſtalline matter has miſs'd a certain ſpeck of the column, and going round it, left it bare as we frequently ſee fluid matter, running over the ſmootheſt ſurface, even water on glaſs will do: after this many added ſmall quantities coming ſlowly to the place have done the ſame, and left the hole ſtill deeper, and neceſſarily fill'd with the water in which it was form'd, and ſtill remains; at length a larger addition of new matter to the ſame plane is driven down with more force, and ſpreads itſelf over the hole, covering up the water within; there is now again a ſmooth ſurface, and every freſh quantity of matter taking the ſame courſe, if it reach ſo far, ſpreads equally over it, and encloſes the water for ever in its cell.

As we find therefore, that Cryſtal and Spar, are both continually ſuſpended in water, and both capable of being rais'd in vapour, and that there needs no more to the formation of the Cryſtals we ſee, than the ſlow evaporation of that water, or vapour in a proper place, we need not at all heſitate to believe, that as we have evident proofs that Spar is form'd to this day, ſo likewiſe is Cryſtal; and as even moſt of the known ſtones are form'd on the baſis either of the one or other of theſe bodies, it is not impoſſible but that ſome of them may have been of later origin than is uſually attributed to them.

SERIES III.

CLASS II. ORDER I. GENUS I.

MACROTELOSTYLA.

CRYSTALS with a long intermediate column.

1. *Macroteloſtylum perlucidum, decolor.*
Very bright, colourleſs Macroteſtylum.

This is a very elegant Foſſil, and ſeems to be Cryſtal in the utmoſt degree of perfection. It is of a perfectly pure and equal texture throughout, and generally is entirely free from the white opake blemiſhes ſo common in cryſtal, and from every other foulneſs; it is ever a regularly form'd and perfect body, in figure a double pointed angular column, conſiſting of eighteen planes; the middle column which is ſtrait and even, being compos'd of ſix, and the pyramids which terminate it one at each end, of ſix more each; theſe are far from being all of equal diameters, tho' uſually very equal in length; the pyramidal planes commonly all terminate at the ſame diſtance from their point, but are of very different breadths, four being commonly broad tho' not equally ſo, and two narrow, the narrow ones never joining to one another; the planes of the column are proportionate to the breadth of theſe, which ever anſwer regularly to one another in the two pyramids, the broad ones at one end being ever in a line with the broader at the other, as are alſo the narrower; and to this in a great meaſure is owing the regularity of this ſpecies; this is in its general ſhape conſiderably long and ſlender, and is found of various ſizes, from the length of a barley corn, to that of three inches; its uſual ſtandard is, however, about an inch; it is ever found perfectly looſe, and detach'd from all other bodies, and tho' where one ſpecimen of it is found, there are uſually more near, yet they are very ſeldom found cohering one to another; its pyramidal planes are conſiderably long in proportion to their thickneſs as well as the column; the ſurfaces of theſe is ever perfectly ſmooth, even and polite, not the leaſt ridge, wrinkle, or irregularity, is ever to be found in any of them; but this is not the caſe in the planes of the column; they appear indeed to an incurious obſerver, as ſmooth and bright as theſe, but more attentively examin'd, they are ever found to be ſtriated acroſs with extreamly fine, ſlender, and very cloſe lines; theſe are uſually very ſtrait and determinate at their edges, and may evidently be diſcover'd to be the edges of ſo many flakes, or incruſtations of additional matter, evenly ſpread over the pyramidal planes, and reaching to different diſtances along theſe: It is even plain to the curious obſerver, that theſe added flakes are dilated and driven equally from both pyramids; and it is a very pleaſing thing to obſerve how they meet uſually about the middle of the column, and fall over or under one another; and it is not a little wonderful in this ſpecies, that they make no protuberance, or irregularity of the ſurface wherever they meet; this ſeems in a great meaſure to be owing to their not meeting all in the ſame place.

It is very hard, and breaks equally in any direction; its flakes, if ſtruck off ever ſo thin, are not at all flexile, or elaſtic; it is extreamly bright and tranſparent, and of a fine water, naturally perfectly colourleſs, but ſubject, like all other Cryſtals, to be ting'd to different colours by metalline tinges, if it hath met with them in its original formation.

It is moderately heavy, and very freely and plentifully gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines to an opake white.

Examin'd by the Microſcope, the tranſverſe ſtreaks on the columns appear evidently the edges of a number of plates, added one to another in the formation of the ſtone.

It is a very rare ſpecies in England, but frequent enough in the mountains of Germany; it ſometimes lies in the ſtrata of looſe earth, but more frequently in the horizontal cavities in ſtrata of ſtone; I have ſeen it among the rocks at Mount Sorrel in Leiceſterſhire, and Dr. Woodward ſeems to have had a ſpecimen of it from Cornwall.

2. *Macroteloſtylum lucidum, nigreſcens, pyramidibus brevioribus.* *Blackiſh, bright Macroteloſtylum, with ſhort pyramids.*

This is a ſpecies of equal elegance and beauty with the former; it is of a perfectly pure and equal texture, and ſcarce ever found with the leaſt appearance of clouds, films, or any other of the uſual foulneſs of cryſtal; it is ever regularly form'd and perfect, and is in figure a very long and ſlender column, terminated at each end by a ſhort and very regular pyramid; it is of various ſizes, from one eighth of an inch, to an inch and half in length, but its uſual ſtandard is three quarters of an inch; it is uſually found perfectly ſeparate from all other bodies, tho' commonly there are conſiderable quantities of it found together; it is compos'd of eighteen planes, ſix on the intermediate column, and ſix at each of the pyramids; the planes both on the pyramids and column regularly anſwer one another, and are in this ſpecies the moſt uniform and equal in breadth of any that I know; the pyramidal planes are very ſhort, but they are very nearly all of the ſame length as well as breadth; the rim, or line that marks the inſertion of the column into each, being very nearly all round the body of equal diſtance from the ſummit, or apex of the pyramids; the ſurfaces of theſe are perfectly even, ſmooth and polite, not the leaſt ridge or line ever appearing on any them, but the ſurfaces of the planes of the column are plainly mark'd with the tranſverſe lines, the marks of the edges of the ſeveral coats by which the whole was form'd; tho' theſe are very ſlender, but few in number, and conſiderably diſtant one from another.

It is of extream hardneſs, much ſuperior to that of ordinary cryſtal, is not to be ſcratch'd, and breaks very difficultly tho' equally in any direction; its thinneſt pieces are not at all flexile, or elaſtic; it is of a very remarkable brightneſs, and tranſparence, and of a fine black water; its whole ſubſtance has indeed a manifeſt blackiſhneſs diffus'd thro' it, and it is never, that I have yet obſerv'd, ting'd with any other colour.

It is moderately heavy, and gives fire very plentifully with ſteel.

It will not at all ferment with Aqua Fortis.

It is difficultly calcin'd, but becomes perfectly white.

Examin'd by the Microſcope, its luſtre is ſurprizing; its pyramidal planes eſpecially are of a moſt elegant brightneſs, and its columnar ſhew very plainly its ſtructure in their tranſverſe ſtriæ.

It is very rare in all parts of the world; we have it however ſometimes among what are call'd the Corniſh diamonds; and in ſome parts of Italy there are ſometimes found heaps of it of a hundred or more ſpecimens uſually all of the ſame ſize together, and lodg'd in cavities of ſtone, but ever perfectly looſe, not adhering any where to the ſtone.

3. *Macroteloſtylum hebes, albicans, pyramidibus irregularibus.* *Dull, whitiſh Macroteloyſtylum, with irregular pyramids.*

This alſo is an elegant Foſſil, but in all reſpects greatly inferior to either of the precedent; it is of a firm compact texture, uſually clear and pellucid in ſome parts, but full of whitiſh, and ſometimes browniſh clouds and foulneſſes in others, it is ever of a determinate form, but very irregular and uncertain in the parts of its figure; it is a ſomewhat long and moderately thick column, terminated at each end by a pyramid, whoſe length is not eaſy to be determin'd, ſince it is ever longer in ſome parts than in others; three of its planes being uſually near twice as long as the others, and theſe regularly anſwering one another in lines along the column, ſo that the rim or circle of inſertion of the column into theſe is very crooked and uncertain; theſe planes are not more unequal in length than they are in breadth, four of them are ever much broader than the other two, and the columnar planes propagated from theſe, and adjoining to them, are broad in proportion; it is almoſt ever of one regular ſize, which is under an

inch

inch in length, and near half an inch in diameter. It is uſually found ſingle, and adhering to no other body, and is compos'd, like the reſt, of eighteen ſides, ſix on the column, and ſix on each pyramid, but theſe the moſt irregular both in the breadth and length of any of this Genus. The ſurfaces of the pyramidal planes are uſually perfectly ſmooth, but ſometimes they have ſmall white ſpecks or blebs on them, more prominent than the reſt of their ſurface; the columnar planes carry the leaſt marks of their ſtructure of thoſe of any of this Genus; but a nice eye will, however, diſtinguiſh that they are regularly ſtriated acroſs; it is in the purer parts moderately pellucid, but of leſs brightneſs than Cryſtals commonly are, and has naturally ſomewhat of a whitiſh caſt, and often from particles of iron a pretty fair purple tinge. It is moderately heavy, and conſiderably hard.

It gives fire pretty readily with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines more freely than the common Cryſtal to a pure white.

The Microſcope ſhews the tranſverſe ſtreaks on its columnar planes very diſtinctly, and gives a fairer view of what they are, than it can in ſpecimens of greater brightneſs.

It is common in Germany; and is ſometimes found in Yorkſhire, and in Cornwal.

SERIES III.

CLASS I. ORDER I. GENUS II.

BRACHYTELOSTYLA.

CRYSTALS *with a ſhorter intermediate column.*

1. *Brachyteloſtylum lucidum, decolor, pyramidibus longioribus. Bright, colourleſs Brachyteloſtylum, with long pyramids, and a ſhort column.*

This is a ſpecies of Cryſtal that equals any in brightneſs and tranſparence. It is of a perfectly pure, equal and elegant texture, and uſually is entirely free from ſpots, films, clouds, or other foulneſs. It is a very regularly, tho' very ſingularly ſhap'd body, being ever of a ſhort thick column, with very long and tapering pyramidal ends. It is of various ſizes, but uſually of about an inch and half in length, and ſometimes is near three quarters of an inch in thickneſs. It is compos'd, as all of this Order are, of eighteen planes, ſix on each of the pyramids, and ſix on the column. Its planes are ſeldom any of them very regular, there are uſually four both on the column and pyramids, which are much broader than the other two; and thoſe of the pyramids, tho' all long, are very irregularly ſo; two of them being uſually much longer than the reſt, and running a conſiderable way into the column; ſo that from the ends of theſe which join the column, to the ends of the longer at the other end, the column has very little length; the broader planes of the pyramids always regularly anſwer one another, and have neceſſarily a broader plane on the column to join them. The pyramids in this ſpecies are the longeſt, and moſt tapering in proportion to their breadth of thoſe of any ſpecies. Their ſurfaces have the natural ſmoothneſs of that part of Cryſtal, in a very high and elegant degree, and have a natural poliſh, that the ſkilfulleſt lapidary cou'd not eaſily mend; thoſe of the columnar planes are very ſlightly ridg'd, and require to be plac'd in a proper ſide light, to have their ſtriæ any thing diſtinctly viſible, and then they appear very broken, interrupted and irregular; theſe planes not appearing compos'd of ſo even plates as thoſe of moſt other kinds.

It is of very great brightneſs and luſtre, naturally perfectly colourleſs, and elegantly tranſparent; but not unfrequently ting'd with purple or yellow; and what is very ſingular, that is often on the pyramids, or a part of them only, not at all on the column; the whole occaſion of that, however, is, that the metalline particles, tho' join'd with all the cryſtalline matter in the fluid, yet when they came to be affix'd in ſmall quantities to the pyramids, could not ſpread and diffuſe itſelf as the cryſtalline matter did; but continually, in every freſh application, ſuffer'd that part of the Cryſtal that ſpread fartheſt, to run free and without it; this is the more plainly the caſe alſo, as the colour is always the deepeſt at the very ſummit of the pyramids, and becomes fainter, as it approaches their baſe; this is alſo a ſtrong confirmation of the truth of the ſyſtem here delivered, of the formation and encreaſe of Cryſtal.

It is conſiderably hard, not at all to be ſcratch'd, and breaks difficultly, but equally in any direction; and its ſmalleſt ſplinters are not at all flexile or elaſtic.

It is moderately heavy, and gives fire very freely with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very difficultly, but to a pure ſnow white.

Examin'd by the Microſcope, its tranſverſe ſtreaks appear, tho' very fine, and very irregular, yet more plainly the extream edges of plates, than in moſt of the other ſpecies; they are notch'd, undulated and inflected, juſt as ſmall quantities of extreamly fine matter, running ſlowly and difficultly down a polite and ſmooth ſurface, might naturally be expected to terminate.

It is a very rare ſpecies, ſeldom found more than one in a place, and that ſometimes on the ſhores of rivers, but more frequently lodg'd in ſtrata of earth, or looſe and independent in thoſe of a lax free ſtone. I have not heard of it in England, or indeed any where, except in Bohemia.

2. *Bractyteloſtylum lucidum fuſcum, pyramidibus brevibus, columna breviſſima.*

Bright-brown Bractyteloſtylum, with ſhort pyramids, and an extreamly ſhort column.

This is a very ſingular and very elegant ſpecies, of a ſtrong and elegant colour, and is ever thicker than it is long. It is of a very pure, equal and unblemiſh'd texture; very ſeldom having the leaſt partial cloudineſs, and never any other foulneſs. It is of a very regular form, ever a ſhort thick column, with ſhort blunt pyramidal ends. It is of various lengths, from a third part of an inch, to three inches, and is always of a greater meaſure in diameter than in length; it is compos'd, as the reſt, of eighteen planes, ſix on each pyramid, and ſix on the column; theſe are irregular both in length and breadth; three of the pyramidal ones are ever much longer than the other three at each end; and theſe, with one of the ſhort ones, are much broader than the other two; theſe broad planes regularly anſwer one another, and are join'd by four broad ones on the columns, as are the two narrow, by two narrow ones; the rims or circles of the junction of the pyramids and column, are ever very uneven, from the irregular length of the planes; the ſurfaces of the pyramidal ones are perfectly ſmooth and even, and extreamly bright and gloſſy; but thoſe of the columnar, are ever very ſtrongly ridg'd, in a regular tranſverſe direction; the ſtriæ made by theſe ridges, are very viſible, and the ſurface of the plates which they are the edges of, are very ſenſible to the touch, and evidently riſe above the ſurface of the next plates; they are all diſpos'd from their ſeparate pyramids, toward the center of the column, but many of them reach not nearly ſo far; and the middle part of the column, is from this cauſe evidently of a ſmaller diameter than its ends. The formation of Cryſtal is in no ſpecies more evident than in this, the whole matter having been plainly added at the two ends, and ſpread as far as each plate or cruſt of it could reach, before it became too much concreted to be driven farther by the ambient fluid. The extream ſhortneſs of the column in this, makes it the more elegantly ſeen; as the ſeveral ridges, which in a longer column might have been plac'd more diſtant, are here ſo numerous, in ſo ſhort a ſpace, that they look like ſo many regular ſtairs, or ſteps of a ladder.

It is uſually found in large parcels, in the ſame place, eſpecially the ſmaller ſpecimens of it; but theſe never cohere in any part one with another, and the larger are uſually found ſingle; they are of extream brightneſs, very beautifully tranſparent, and of a fine deep blackiſh brown; never, ſo far as I have yet obſerved, ſubject to any tinge of a different colour.

It is moderately heavy, extreamly hard, and not to be ſcratch'd, and breaks very difficultly, but equally in any direction. Its thinneſt fragments are not at all flexile or elaſtic.

It very freely and plentifully gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It calcines very ſlowly into a pure and perfect white.

Examin'd by the Microſcope, its ſeveral plates are ſeen perfectly diſtinct, and ſome may be diſcovered to be of twice or three times the thickneſs of others; its pyramidal ſurfaces are ever without blemiſh.

It is to be obſerv'd, that in this, and many other ſpecies of Cryſtal, where the ridges and plates are thus diſtinct and prominent; it is only on the ſurface that they are ſo, the interior part of the Cryſtal being very equal and uniform; and the reaſon of this is not difficult to aſſign, ſince it is certain, that the thinner the additional matter is, and the ſlower it concretes, the more perfectly it unites to the maſs it is diffus'd over, and is diffus'd the more equally over it; the thicker and more haſtily concreting, the more imperfectly it unites to the maſs, and the leſs equally it ſpreads over it. Theſe things conſider'd, it is eaſy to conclude, that when the cryſtalline maſſes firſt concrete, the fluid is in large proportion to the contain'd Cryſtal; and what is firſt affix'd to the maſs is much diluted, ſpreads eaſily, concretes ſlowly, and unites perfectly with it. Whereas the laſt incruſtations, if they may be ſo call'd, being of Cryſtal ſuſpended in a little quantity of fluid, and of itſelf juſt ready to concrete, can be ſpread even from their own nature but a little way, and even want the agent that ſhould dilate them ſo far, the ambient fluid being now reduc'd to a very ſmall quantity; the neceſſary conſequences of any one of which cauſes, muſt be the unequal diffuſion of the laſt added quantities of matter, and theſe plain ridges on the ſurface of the columnar planes; the only wonder is, that they are not much more frequent, ſtrong and plain; but we are to conſider, that in the concretions of ſalts, the moſt analogous of all things to the formation of Cryſtal, there is ever yet a conſiderable quantity of fluid left after the largeſt firſt Cryſtals are perfectly form'd, tho' no more matter will be added to them, nor new ones form'd, but by means of a freſh evaporation, that theſe firſt Cryſtals are ever the moſt fair and perfect; and all the ſucceeding ones, from different new evaporations, gradually worſe and worſe, till the laſt are very ſcabrous and imperfect; thus it may probably be in the fluid, in which the cryſtalline particles were originally ſuſpended; the ſame quantity of fluid may from different evaporations, by different degrees of ſubterranean heats, form different ſeries of Cryſtals; a few of the latter ſets of which may be only thus ridg'd, or of ſuch as have metalline, earthy, or other admixture; which, tho' in ever ſo ſmall quantities, may hinder the nice operation of theſe coats, eſpecially the laſt of them, while the greater number of Cryſtal columns and ſprigs, form'd of pure Cryſtal, or of Cryſtal ſuſpended in a ſufficient portion of fluid, have aſſum'd their forms, in ſuch perfection and regularity, as to have even obliterated the traces of the manner of their formation.

This is a rare ſpecies, I have not heard of it in any part of England; in the Eaſt Indies it is found on the ſhores of rivers; and in Germany on the ſides, and at the bottom of hills.

3. *Bractyteloſtylum lucidum, ſubflavum, pyramidibus regularibus, columna brevi.*

Yellow, bright Bractyteloſtylum, with regular pyramids, and a ſhort column.

This is an elegant and very rare ſpecies; it is of a moderately fine, equal and pure texture, but is frequently debas'd by cloudy ſpots, and ſometimes by films, ſtreaks, and as it were flaws of a miſty look; it is a very perfect and regularly form'd kind, and is ever a ſhort column, terminated at each end by a very regularly ſhap'd, and moderately ſiz'd pyramid. It is of various magnitudes, from one fourth of an inch to two inches in length, and uſually about one third of its length in diameter. It is compos'd of eighteen ſides or planes, ſix on each of the pyramids, and ſix on the column; theſe, however, are not all regularly of a ſize, but two of them oppoſite to one another on each pyramid, and the two on the column that join theſe are ever conſiderably broader than the reſt: The pyramidal planes, however, tho' thus different in breadth, are all very evenly and regularly of the ſame length, as are alſo neceſſarily hence thoſe of the column. The ſurfaces of the whole are but moderately bright, in compariſon with thoſe of the precedent; but thoſe of the pyramidal planes much excel the columnar, and are perfectly ſmooth and even; the columnar are conſiderably ridg'd, and not unfrequently rough and unequal, and ſhew themſelves evidently to be made up of ridges, or the ends of plates of freſh added matter, running from each pyramid, down the column, to its center or thereabout.

It is ſometimes found ſingle, but more frequently in conſiderable cluſters, of forty or fifty ſpecimens together, thrown irregularly into a maſs, all cohering to one another, very firmly and uſually intrenching upon, and injuring one anothers ſhape; it is moderately bright, and conſiderably tranſparent, and is naturally of a faint browniſh yellow. It is of conſiderable hardneſs, will not be ſcratch'd by ſteel, breaks equally in all directions, and is not at all flexile or elaſtic in the thinneſt pieces.

It is moderately heavy, and pretty freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines, with a ſtrong fire, to a pure and beautiful white.

Examin'd by the Microſcope, the manner of its formation appears extreamly evident; the cruſts being all plainly diſtinguiſhable in the ridges; and all theſe running from both pyramids toward the center of the column, plainly evince, that in theſe Cryſtals the matter is ever affix'd to both points, and from both dilated equally to the column; the outermoſt plates are here ever the thickeſt, and reach the ſhorteſt way down the columns; this, tho' evident to the Microſcope, is not ſufficiently ſo to the naked eye, to make the column appear as in reality it hence muſt be, thinner in the middle than at its ends.

It is a very common Cryſtal in Sileſia and Bohemia, and we have it ſometimes in England. It is found ſingle in the hills in Yorkſhire, and I lately receiv'd from Mr. Simon of Dublin, a large congeries of it, with this ſingular variety, that all the colour was on the outſide almoſt in form of a cruſt, the inner part being clear and colourleſs.

4. *Brachyteloſtylum lucidum, decolor, columna in medio gibboſa, brevis.*

Bright, colourleſs Brachyteloſtylum, with a ſhort column, gibbous in the middle.

This a ſpecies made ſingular by an accident, which we are not to wonder that this has, but rather that moſt others of this kind have it not. It is a very fine Cryſtal, of an extreamly pure and elegant texture, and often quite free from films and clouds, and never much affected by them. It is very certain and determinate in its form, ever a ſhort and conſiderably thick column, with two moderately long and ſharp pyramids at its ends, and always with a circular, but irregularly prominent ridge round its middle; it is moſt frequently of about three quarters of an inch in length, and a little more than half its length in diameter; it is compos'd, as the reſt, of eighteen planes, ſix on its column, and as many on each pyramid; theſe are the moſt regularly all of a breadth of thoſe of almoſt any ſpecies I know, but they are not perfectly ſo: thoſe of the pyramids are ever two of them conſiderably ſhorter than the reſt; the others not of an equal, but various length, and the columnar planes muſt neceſſarily conform to the ſhape of theſe, and be broadeſt where they are ſo, and longeſt where theſe have leaſt length. The ſurfaces of the pyramidal planes are extreamly bright, gloſſy and beautiful, and never ſubject to the leaſt defect or blemiſh; thoſe of the columns appear at firſt ſight ſmooth, unleſs in the middle, but nicely examin'd, they will be found to be not a little ridg'd; their ridges or the ends of their component plates running from each end, regularly toward the middle of the column, where there is a very remarkable circular ridge, running of pretty nearly an equal thickneſs round the column; this is uſually of about one ſixth part the breadth of the columns length; it is evidently form'd of the meeting of the plates from each end, where they have driven one another up, like the meeting of two waves; and this is viſible enough in the ſtructure of the ridge itſelf, which is irregularly and thinly laminated, if view'd attentively.

It is found ſingle and ſeparate, never adhering to any other body, tho' not unfrequently immers'd in the ſtrata of ſtone; it is a very bright Cryſtal, extreamly tranſparent, and of a fine water, and is but little ſubject to metalline tinges. It is of great hardneſs, and not to be ſcratch'd by ſteel, it breaks equally in all directions, and is neither flexile or elaſtic.

It very freely gives fire with ſteel.

It will not ferment with Aqua Fortis.

It calcines ſlowly to a pure ſnow white.

Examin'd by the Microſcope, its ridge is ſeen of an extreamly finely but irregularly plated ſtructure, the flakes being broken in various directions, but all extreamly thin; thoſe of the laſt additions evidently do not reach this, but terminate near the pyramids, or at different diſtances between theſe and this ridge.

It is very plentiful on the ſhores of rivers in Germany, and is ſometimes found alſo in earthy ſtrata, on the ſides of hills, but more frequently in ſtone.

5. *Brachyteloſtylum hebes, pyramidibus magnis, columna breviſſima depreſſa.*

Dull Brachyteloſtylum, with large pyramids, and an extreamly ſhort depreſs'd column.

This is a yet more ſingular ſpecies than the former, and is an accident in Cryſtal quite of a contrary kind from that which makes that ſpecies; there the additional matter from the pyramids met in the center of the column, and form'd a prominent circle: here it ſeems in the latter additions, not to have gone beyond the verge of the pyramidal planes, and the whole column, which is moſt extreamly ſhort, to be ſunk in; not riſing near the level of the edges of the baſe of the pyramids.

It is a very foul, and opake Cryſtal, of a coarſe texture, and has, inſtead of the films and opake ſpecks, common to many of the coarſer Cryſtals, a continu'd cloud as it were diffus'd thro' its whole ſubſtance; it is a very perfect and regularly form'd body, ever keeping cloſely and exactly to all particulars of its ſingular figure; and cannot be ſo properly as the reſt call'd a column terminated by pyramidal ends, for the pyramids really make up almoſt the whole maſs; they are large, ſhort, broad and thick, conſiſting each of ſix planes, and are join'd by a ſlenderer column, hexangular alſo, and with its planes very exactly anſwering theirs, tho' not more than one ſixth of an inch in length, in a ſpecimen of an inch long, which is the moſt frequent ſize of this ſpecies; its pyramidal planes are irregular, four of them being broader than the other two at each end, but they are all very regularly of the ſame length, ſo that the circle of the baſe of the pyramids is very even and regular; the planes on the ſhort column anſwer regularly in breadth to thoſe on the pyramids, which alſo ever anſwer one another, and are join'd by thoſe of proportionate breadth in the column. The ſurfaces of theſe pyramidal planes are very rough and unequal, and ever full of prominences and cavities; the columnar planes are ſcarce at all viſibly ridg'd or ſtriated, but the edge of the baſes of the pyramids that ſtand above the column, are frequently of a ſtructure, that more than all things ſhews the formation of the whole claſs of Cryſtals. They are compos'd of almoſt innumerable extreamly fine and thin plates, laid with great beauty and regularity on one another, not all going over the whole circumference of the pyramids, but many of them covering only the broader planes; and hence, the plain cauſe of their being broader than the reſt, from the additional matter having been added to their ſurfaces, and not extended farther; others may be trac'd, where the matter has been added to the apex of the pyramid, and equally dilated quite round the whole baſe, making all the angles, and giving one compleat, tho' very ſlender incruſtation; this ſtructure is not, however, viſible in every ſpecimen nor always in both parts of the ſame ſpecimen; ſometimes while one baſe ſhews it in all its beauty, the other is quite plain; a larger quantity of the additional matter having been well dilated and fallen over the baſe, has in this caſe cover'd it, and at once obliterated all the elegance of its ſtructure; the cruſts that are neareſt the column, are ever the thinneſt and moſt indiſtinct in this ſpecies, thoſe that have been laſt form'd being the plain and evident ones.

It is ever found ſeparate and detach'd from all other bodies, but uſually conſiderable numbers of ſpecimens of it occur together. It has the leaſt brightneſs of the whole Cryſtal claſs; is of a dull, and ſomewhat browniſh colour, and ſcarce at all tranſparent. It is very heavy, but leſs hard than common Cryſtal; it will not, however, be ſcratch'd by ſteel; it breaks equally in all directions, and is not at all flexile or elaſtic.

It gives fire with ſteel leſs freely than the purer Cryſtal.

It will not at all ferment with Aqua Fortis.

It calcines pretty readily to a pure white.

Examin'd by a Microſcope, its ſurface appears by much the moſt unequal of that of all the Cryſtals. Its external plates on the prominent part of the baſes of the pyramids, are very diſtinctly viſible, but all ſeem very firmly join'd; its column has but few, and thoſe very ſmall, and very diſtant ſtriæ; they are not regularly tranſverſe, but crooked and variouſly undulated.

It is a very rare ſpecies in England, but is in many of the German cabinets, and is found uſually in cluſters of forty or more, tho' not cohering; in cavities of the ſtrata, of what they call ſwine ſtone, an ordinary ſtone of a ſtratum deſcrib'd in its proper place.

6. *Brachyteloſtylum lucidiſſimum, nigricans, minimum, pyramidibus regularibus.*

Small, bright, blackiſh Brachyteloſtylum, with regular pyramids.

This is one of the moſt elegant and regularly form'd bodies of this whole claſs. It is of an extreamly fine, pure and equal texture, and never ſubject to the ſlighteſt appearance of clouds, films, or any other foulneſs. It is extreamly regularly form'd, and ever is a ſhort, but very regularly hexangular column, terminated at each end by a moderately long pointed and regularly conſtructed pyramid. It is of very various ſizes, tho' ever extreamly minute; the largeſt ſpecimens of it do not exceed one ſixth of an inch in length, and are of about the diameter of a barley-corn; but among theſe, there are ever multitudes ſo ſmall, that it requires a Microſcope to diſtinguiſh them; the moſt minute of them, however, when carefully examin'd, are found as perfectly form'd, and as regular in their ſhape as the larger; it is ever compos'd of eighteen ſides or planes, each of the pyramids being made of ſix of theſe, all very nearly equal both in length and breadth, and the column thence neceſſarily of ſix as equal. The pyramidal planes are long for their breadth, and gradually taper off to a very fine point; they are of a perfectly ſmooth and equal ſurface, and of a brightneſs and luſtre to be equal'd by few of the Cryſtals. The planes of the columns are little leſs bright, but to the naked eye do not ſhew the leaſt mark of their ſtructure, or the ſlighteſt tranſverſe ſtreak. It is a ſpecies never, ſo far as I can learn, found ſingle, but uſually in great quantities together, tho' never cohering to one another, and very rarely to any other body. It is of a very ſingular brightneſs, and fine black water, and is indeed in its native ſtate, ſcarce at all diſtinguiſhable from a table diamond; it is ſubject to no tinge, but ſometimes loſes its black caſt; and then, tho' not leſs bright, has much leſs of the diamond look.

It is of very great hardneſs, not to be ſcratch'd by ſteel, not eaſily broken, but flying off equally in any direction; its thinneſt flakes are not at all flexile or elaſtic. It is conſiderably heavy.

It very freely gives fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It is very ſlowly and difficultly calcin'd.

Examin'd by the Microſcope, its pyramidal planes have all the luſtre of a poliſh'd ſurface, free from all flaws and blemiſhes, and more perfect than the greateſt art can give to ordinary Cryſtal; its columnar planes, tho' they give no traces of their ſtructure to the naked eye, yet thus examin'd, ſhew the edges of their ſeveral plates in ſo many even and regular tranſverſe ſtriæ; but theſe are the fineſt in this of any ſpecies of Cryſtal that I have had an opportunity of examining.

It is found in great plenty in many parts of Germany, lodg'd in accidental cavities of a black fiſſile ſtone, among duſt and ſmall particles of the ſtone itſelf, but its ſpecimens no where cohering either to the ſtone, or to one another.

SERIES III.

Class II. Order II. Genus I.

PAURAEDRASTYLA.

PERFECT *Cryſtals, with double pyramids, and no intermediate column, compos'd of twelve planes; or two hexangular pyramids join'd baſe to baſe.*

1. *Pauraedraſtylum albicans, pyramidibus brevioribus.* *Whitiſh Pauraedraſtylum, with ſhort pyramids.*

This is a very regular and elegant Cryſtal. It is of a conſiderably fine and pure texture, and but little ſubject to films and clouds, and often perfectly free from them; it is very regularly form'd, and ever keeps with great exactneſs to its figure, which is that of a double pyramid, or two ſhort and ſomewhat obtuſe pyramids, with broad baſes, and join'd at them firmly to one another, without the intervention of a column, or any other body whatever; it is uſually very ſhort, and conſiderably thick, an inch being its utmoſt length, and three quarters of an inch very frequently its diameter. It is ever compos'd of twelve ſides, each of its pyramids being made up of ſix planes, four of which are much broader than the other two, but all the planes on both pyramids are very exactly of the ſame length, and the broad ones on one, anſwering exactly to the broad ones on the other, they make a very regular body, as their baſes alſo meet regularly, and cohere firmly and intimately one with another. The ſurfaces of theſe planes are all perfectly ſmooth and even, having no appearance of a plated ſtructure on them, any more than on the pyramidal planes of the columnar kinds, and the edges of the baſes of theſe pyramids never ſtanding out at all beyond one another; there is in no part of this ſpecies the leaſt trace of the order or manner of its formation.

It is uſually found ſingle, and always looſe and independent of all other bodies; it has a whitiſh caſt, and is very tranſparent, tho' not ſo bright as thoſe that are perfectly colourleſs, or of a deeper water; it is ſometimes found ting'd with a pale yellow, and in that ſtate makes a very beautiful figure. It is conſiderably heavy, and moderately hard; it is not to be ſcratch'd by ſteel, and does not break eaſily, but equally in any direction; its flakes are not at all flexile or elaſtic.

It very freely gives fire with ſteel.

It will not ferment with Aqua Fortis.

It calcines but very ſlowly in the fire.

It is found in many parts of France, always ſingle, and uſually lodg'd in ſtrata of ſtone.

2. *Pauraedraſtylum fuſcum, pyramidibus longioribus.* *Brown Pauraedraſtylum, with long pyramids, and without a column.*

This is a very elegant ſpecies; it is of a perfectly pure, fine and regular texture, and is always free from films, or the other uſual foulneſſes of Cryſtal. It is a very perfect and regularly form'd body, compos'd of two longiſh pyramids, with very broad bottoms, join'd at their baſes to one another, without the intervention of any column. It is of different ſizes, from one eighth of an inch, to three inches or more in length, and uſually of about one third of its length in diameter. It is compos'd of twelve irregular planes, two of each pyramid being nearly of twice the breadth of the reſt, and thoſe alſo a little longer; ſo that the compleat Cryſtal is much leſs accurately circumſcrib'd than the former ſpecies; the broad planes of one pyramid in this kind, do not anſwer with the broad ones of the other, but are join'd irregularly to the narrower; ſo that the circle which deſcribes the joining of the two baſes, is neceſſarily very uneven and irregular; the ſurface of all the planes of this body, are extreamly even, ſmooth and gloſſy, not the leaſt blemiſh, prominence or cavity, is ever to be ſeen on them, and their natural poliſh is at leaſt equal to the fineſt that art could give them; on theſe there is no where the leaſt mark of the plated ſtructure natural to cryſtal; but this ſpecies, however, is not without traces of its origin and manner of formation, for the commiſſures of the baſes of its pyramids cannot be exact, and it is not unfrequent for one of them to ſtand a little way over the other; in theſe places, one often very elegantly diſcovers the true plated texture of all Cryſtals, and may uſually count many of the plates the pyramid is compos'd of, tho' there are ſome of theſe prominent edges which are perfectly plain, and afford no ſuch ſight.

This ſpecies is ſeldom found ſingle, many of them are often join'd together in an irregular manner, but when they are not ſo, there are uſually a conſiderable number found together; it is of a very elegant pale brown, ſometimes mark'd with a few black ſpots, which are the only fault it is ſubject to, and is of a very ſingular brightneſs, and fine water; it is conſiderably heavy, and extreamly hard.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines but very ſlowly to a perfect white.

It is found in great plenty in ſome parts of Scotland, and ſeems peculiar to that country: It is found on the ſides of hills, and ſometimes ſingly on the banks of rivers.

3. *Pauraedraſtylum obliquum, perlucidum, decolor.*

The crooked, or ſlanting, twelve ſided, clear and colourleſs Pauraedraſtylum.

This is a very beautiful, tho' a very oddly figured ſpecies; it is of a perfectly pure, clear, fine and equal texture, and is ever free from the uſual foulneſſes of Cryſtal; it is a perfectly form'd body, and always keeps ſtrictly and exactly to its ſhape, tho' that is a very ſingular one; it is an oblique or ſlanting double pointed body, made up of twelve irregular planes, which are the ſides of two irregularly hexangular pyramids, which join'd baſe to baſe, conſtitute this body; it is of very various ſizes, from a quarter of an inch, to two inches, or more in length, and about three fourths of its length in diameter; its pyramids are of a moderate length proportionably to their breadth, and have their planes extreamly irregular in regard to one another, tho' their irregularities always exactly anſwer one another in the two pyramids; four of the planes are always twice as long, and twice as broad as the other two, and of theſe four, the two which join to one another, and are fartheſt from the ſhort ones, are much longer and broader than thoſe which ſtand on each ſide between them, and the ſhort ones; ſo that the whole pyramid, if ſingle, and ſet upon its baſe, would ſtand extreamly a-ſlant; to this another with exactly the ſame irregularities, is join'd very nicely and regularly baſe to baſe, the broader and narrower planes each meeting the edge of their correſpondent ſides on the oppoſite pyramid; ſo that the whole, tho' a very oblique and odd figure is, however, perfectly regular in the application of its ſeveral parts one to another in each pyramid; the ſurfaces of theſe planes are all perfectly ſmooth and polite, and carry not the leaſt traces of their ſtructure any more than the rim of junction of the two pyramids, which is ever perfectly even, no part of the one at all hanging over the ſurface of the other.

It is uſually found ſingle, neither join'd to any other body, nor lodg'd among others of its kind, but looſe in the ſtrata of earth, ſand or ſtone; it is perfectly colourleſs, extreamly pellucid, and of a fine water; it is ſometimes ting'd with a faint purple, but that happens but rarely; it is very heavy, and extreamly hard.

It gives fire very freely with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines but very difficultly in a ſtrong fire.

Examin'd by the Microſcope, it appears a very elegant Foſſil, of a more than ordinary purity and brightneſs, but does not give the leaſt appearance of the manner of its conſtruction.

It is common both in the Eaſt and Weſt-Indies, but in no place ſo frequent as in New Spain, where tho' always found ſingle, it is ſo common, that large quantities of it are continually pick'd up; it is valued there as the fineſt of all Cryſtal, and indeed it is ſcarce inferior to any.

4. *Pauraedraſtylum lucidum, nigreſcens, pyramidibus breviſſimis.*
Bright, blackiſh Pauraedraſtylum, with very ſhort pyramids.

This is a very ſingular, and not leſs beautiful ſpecies than any of the precedent; it is of a perfectly pure, fine and equal texture, never ſubject to films, clouds, or any other foulneſs, and in luſtre equal to almoſt any thing of the Cryſtal tribe; it is a very ſingularly ſhap'd but regular body, made up of two very ſhort and broad bottom'd pyramids join'd evenly baſe to baſe, but the one ſometimes a little larger than the other. It is of various ſizes, but about one third of an inch is its uſual length, and its diameter is generally at leaſt equal to its length; it is compos'd of twelve very nearly equal and regular planes; two only on each pyramid if nicely examin'd, will be found, however, to be a little broader than the reſt, but all are very nicely of the ſame length, and are plac'd the broader to meet one another at the commiſſure of the two pyramids; this is not, however, ſo exact as the joining of ſome others, for if nicely view'd, the two pyramids ſeem generally as if not quite evenly laid together, one hanging over at one end, and the other at the other; ſo that tho' there are always prominent edges, yet the pyramids ſeem exactly of the ſame diameter at the baſe, only not exactly evenly apply'd to one another; theſe planes are all very ſhort and taper very nicely to a point, they are of a perfectly ſmooth and even ſurface, and ſhew not the leaſt marks of their ſtructure, but the overhanging edges are in ſome plainly tabulated, tho' in others quite plain and equal.

It is uſually found in quantities together, ſometimes many ſpecimens of it join'd, making up one common ball; at other times all looſe and independent of one another, but never join'd to any other body; it is of a fine blackiſh hue, extreamly bright, and of a fine water; and never, ſo far as I have yet been able to obſerve, ting'd with any other colour; it is moderately heavy, and extreamly hard.

It very freely gives fire with ſteel.

It will not all ferment with Aqua Fortis.

It but very ſlowly and difficultly calcines, but does ſo at length to a pure and fine white.

Examin'd by the Microſcope, its flat ſurfaces are perfectly ſmooth, fine and bright; its prominent edges are ſome of them very finely tabulated, and ſhew with great clearneſs the ſtructure of the maſs; in others of them this is not at all diſtinguiſhable, but one flat ſurface only preſents itſelf no way different from that of the planes of the pyramids, and this ſometimes only on one baſe, ſometimes on both in the ſame maſs, and ſometimes only on a part of one; the whole meaning of this diverſity is, however, that in thoſe edges of a plated ſtructure, the laſt added cruſts have only juſt reach'd to the extent of the plane, and there teminating all evenly and regularly, have left the tabulated ſtructure viſible; whereas in the others the laſt cruſt being too much in quantity, and too far dilated, has, when it reach'd the edge of the baſe, not ſtopp'd there, but fallen over to the ſurface of the adjoining baſe of the oppoſite pyramid, and by that means obliterated the whole appearance of the ſtructure of the whole, and given one plane ſurface in the place of it, the ſame with that of the ordinary planes.

It is found in Italy, Germany, and France, and ſometimes, tho' but rarely, in England, and with us is uſually very ſmall.

SERIES III.

CLASS II. ORDER II. GENUS II.

POLAEDRASTYLA.

PERFECT *Cryſtals with double pyramids, and no intermediate column, compos'd of ſixteen planes, or two octangular pyramids join'd baſe to baſe.*

1. *Polyaedraſtylum fuſcum, pyramidibus brevibus.* *Brown Polyaedraſtylum, with ſhort pyramids.*

This is a very extraordinary ſpecies of Cryſtal, but is far from being the only one to prove that there are ſpecies of Cyſtal not hexangular; it is of a conſiderably fine, clear and equal texture, and is not ſubject to the films or clouds ſo frequent in common Cryſtal, but is often ſpotted with large and irregular blotches of black; it is a very perfect and regularly form'd body, compos'd of two octangular pyramids, conſiderably ſhort and broad, and join'd very evenly and regularly, baſe to baſe, and making the whole a complex of ſixteen planes; it is of very various ſizes, from one eighth of an inch to three quarters of an inch long, and uſually at leaſt of the ſame diameter; its planes are tolerably regular in breadth, tho' if nicely examin'd, four of each pyramid will be found to be broader than the other four; they are, however, all equal, or very nearly ſo in length; and as the broader planes of the two pyramids, are in this as in moſt of the other ſpecies, join'd one to another at the commiſſure, the whole makes together a very regular body; the planes are all of extreamly polite and ſmooth ſurfaces, and ſhew no marks of their ſtructure; nor does the commiſſure of the baſes, which is uſually very exactly and nicely even.

It is uſually found in cluſters of an hundred or more together, but all perfectly looſe, both from one another, and from every thing elſe; it is of a very elegant deep brown, of a conſiderable degree of brightneſs and tranſparence; and, in thoſe ſpecimens which are not foul'd with black ſpots, is a very elegant body; it is very heavy, and conſiderably hard.

It gives fire very freely with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines to a very pure white.

Examin'd by the Microſcope, it ſhews not the leaſt mark of its ſtructure in any part, nor has any blemiſhes in any part of its ſurface.

It is found in conſiderable quantities in Virginia, on the ſides of the hills, lying among a poor ſort of iron ore at ſmall depths.

2. *Polaedraſtylum decolor, pyramidibus longioribus.* *Colourleſs Polaedraſtylum, with longer pyramids.*

This is a very ſingular and extraordinary ſpecies, but is ever conſtant to its figure, and is of as pure Cryſtal as any one of the claſs; it is of an extreamly clear, fine and equal texture; and, ſo far as can be judg'd from the few ſpecimens yet known of it, is ever free from all ſtain, film, cloud, or other blemiſh; it is a ſixteen ſided body, compos'd of two irregular octohaedral pyramids, yet the irregularities of the two, always ſo nicely anſwering to one another, give a great ſhew of uniformity to the whole. It is very long in proportion to its thickneſs for a body of this ſtructure, being uſually found of about an inch, or very little leſs in length, and of not more than a third of an inch in diameter; its pyramids are therefore very long in proportion to their breadth; but they are far from being of the ſame regular length in all parts; two of their planes are in each always much longer and much broader than the reſt; and theſe being placed together, and the other ſix in each gradually becoming ſhorter to the oppoſite planes which are ſhorteſt of all, and not much more than of half the length of the longeſt, the whole pyramid if ſingle, and placed on its baſe, muſt be very oblique; theſe planes are always join'd exactly with the others, anſwering them both in length and breadth in the oppoſite pyramid, and the whole has thence a ſtrange ſlanting look;

the ſurfaces of theſe planes are ever perfectly ſmooth, polite and even, and give no trace of the manner of their ſtructure; nor does indeed any part of the body, for the baſes of the pyramids are ſo evenly and exactly join'd, that there is never the leaſt prominent edge on either ſide.

It is uſually found ſingle and looſe; and is of a very beautiful tranſparence, a very ſingular luſtre, and fine water, and has very much the appearance of a body form'd by art: it is moderately heavy, and extreamly hard.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very ſlowly and difficultly to a pure white.

Examin'd by the Microſcope, it diſcovers no flaw or irregularity in its texture; and is one of thoſe ſpecies by which the formation of Cryſtal could never have been found out.

It has been yet found only in one place, the great mine at Goſſelaer in Saxony; and there is very rarely met with, and uſually at conſiderable depths.

SERIES III.

CLASS II. ORDER III. GENUS I.

ELLIPOMACROSTYLA.

CRYSTALS imperfect, or with ſingle pyramids, one end of their column being affix'd to ſome ſolid body; dodecahaedral, with thinner hexangular columns, and hexangular pyramids.

1. *Ellipomacroſtylum vulgatiſſimum, hexangulum, pyramidatum, albido-pellucidum.*

The common, hexangular, whitiſh, pellucid Ellipomacroſtylum, or ſprig Cryſtal.

This is the moſt known ſpecies of all the Cryſtal claſs, and nature has been ſo very fertile of it, that if we were to ſay, that for every ſingle ſpecimen of the kinds hitherto deſcrib'd, ſhe has given us ten thouſand of this, it would not be going at all beyond the truth.

It is a very regularly form'd and perfect body, of a conſiderably fine and equal texture, but more than all others ſubject to clouds, ſpecks, films and blemiſhes, of a dead and opake white; it is ever in form of a long and ſlender hexangular column, affix'd at one end to ſome ſolid Foſſil, and terminated at the other by an hexangular pyramid; it is of very various ſizes, from a tenth part of an inch in length, to ten inches, or ſometimes a great deal more even than that; nor is there any regular ſtandard to be fix'd for it, it being frequently found of all lengths between theſe, tho' I think of none more than of between one and three inches; the planes both of its pyramids and column are extreamly irregular in length and breadth, and ſo perfectly uncertain even in the manner of their variations, that no ſort of account can be given of them, other than that they are at times all that can happen to a body of that figure, without abſolutely deſtroying it; all that nature ſeems to have meant in its ſtructure, being, that it ſhould be always hexangular, but obſerve no farther regularity: the pyramidal planes are often one, often more, narrower and ſhorter than the reſt, and this in that extream degree, that it is no unfrequent thing to ſee one plane of more than three times the length and diameter of another; the columnar planes joining theſe, and beginning where they terminate, muſt neceſſarily be longer or ſhorter in a reciprocal proportion to them; and being form'd of matter propagated from them, can be naturally of no other diameter than their parent planes, and are conſequently as various and as uncertain in length and breadth as theſe.

The pyramidal planes in this, are uſually in general long in proportion to the ſize of the Cryſtal; they are ever perfectly even, ſmooth and gloſſy, without the leaſt appearance of ſtreaks, lines, or any other mark of their ſtructure, and uſually without any other blemiſh; the columnar planes are, on the contrary, very plainly ridg'd, ſtreak'd, and ſtriated tranſverſely; the ſtriæ uſually pretty cloſe and fine, till they reach pretty near the part where the column is affix'd to the ſtone, where they are obliterated; and the whole column in moſt ſpecimens, is coarſe, opake and white.

This is ſcarce ever found ſingle, but uſually in whole cluſters, frequently very beautifully arrang'd, and is naturally of a conſiderable brightneſs and tranſparence, but always has even in its pureſt parts ſomething of a whitiſh tinge.

It is moderately heavy, and conſiderably hard, and not to be ſcratch'd by ſteel; it breaks equally in all directions, and even in its thinneſt flakes, has not the leaſt flexility, or elaſticity, but is perfectly rigid and brittle.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines after ſome time to a pure white.

Examin'd by the Microſcope, its pyramidal planes appear perfectly ſmooth and polite, but there are ridges, or tranſverſe ſtriæ on the columnar ones, which are very evidently diſcovered to be the edges of ſo many flat and extreamly thin flakes of which the column has evidently been form'd; and all of them being without exception propagated from the top of the column toward the root, evince beyond all poſſibility of doubt, that the additional matter of which the column was made up to its preſent ſize, was all apply'd to the top of the pyramidal planes, and from them dilated by the circumambient fluid, and driven down the planes of the column adjoin'd to them.

The great irregularity of the breadth of theſe planes, and thoſe of the column, uſually being of the ſame breadth with thoſe of the pyramid to which they are join'd, and exactly anſwering to all their irregularities, are farther proofs not only of the whole having been thus form'd, but that the matter tho' always added to the pyramidal planes, has been uſually added in great irregularity to them, ſome having ever had a much greater proportion of it than others.

It is found in almoſt all parts of the world, but no where ſo plentifully as in Germany; we have of it in great plenty in England, and the county of Kerry in Ireland, has been long famous for it.

It is ſubject to all ſorts of metalline tinges, and becomes the counterfeit of all the Gems; it is met with green, red, yellow, and blue, and is then call'd the Pſeudoſmaragdus, Pſeudorubinus, Pſeudotopazius, and Pſeudoſapphirus; and is not only ſubject to theſe regular and diſtinct colours, but to all admixtures of them two or more together; it is frequently found colour'd alſo only on the pyramid, the colour not extending at all or but a little way into the column, this is owing to the matter of it not being ſo diffuſible as the cryſtalline; and is a farther proof, were any farther neceſſary, of all the applications of matter being made to the top, or pyramid, only in the formation of Cryſtals.

Sileſia, Bohemia, and the Hartz Forreſt, are famous for theſe colour'd Cryſtals, and they ſometimes ſell at a good price, and paſs among our jewellers for better things than they really are; tho' they are generally ſoften'd by the metalline admixture that gives the tinge, and do not bear the file ſo well as pure cryſtal; beſides theſe varieties, this ſort of Cryſtal is well known to be more than all others ſubject to what people call hairs; which are extreamly thin ſtreaks of a duſky and opake mineral matter, not of any one determinate kind, but of different in different ſpecimens; they are ſometimes brown, ſometimes grey, and ſometimes black, and are ever of the ſubſtance of that matter that was moſt at hand at the time of the formation of the Cryſtal; and uſually of that in the ſtone to which it adheres.

2. *Ellipomacroſtylum pellucidum, decolor.*
Bright, colourleſs Ellipomacroſtylum.

This is a ſpecies generally confounded with the former; but ſome of our lapidaries are accurate enough to diſtinguiſh it, and turn their judgment to ſome advantage, ſelling it frequently, when poliſh'd, for the white Sapphire, to which it approaches more than any other body; tho' if they were brought together, the counterfeit would ſoon be diſcover'd.

It is of an extreamly pure, and perfectly clear, fine and elegant ſtructure, and is always free from foulneſſes of all kinds. It is uſually a tolerably regularly form'd body, few of its columns being ſubject to any great irregularities. It is compos'd of twelve planes, in a long and ſlender hexangular column, terminated by a regular, but not very long hexangular pyramid; it is of various ſizes, from one tenth of an inch, to three or four inches in length; but its uſual ſtandard is about an inch and half, and it never has been ſeen of the vaſt ſizes that the common Cryſtal is frequently found of. Its pyramidal planes are uſually four of them ſomewhat broader and longer than the other two, but never very greatly ſo; and the columnar planes propagated from theſe, always very regularly anſwer them in breadth; the pyramidal planes are conſiderably broad in proportion to their length; they are of an extreamly even and gloſſy ſurface, and always free from blemiſhes or irregularities of any kind; the columnar planes are alſo very bright and gloſſy, but they are very plainly ſtriated, or full of fine tranſverſe lines, which are the edges or ends of ſo many extreamly thin cruſts of additional matter; by the ſucceſſive application of which to the pyramidal planes, and its being dilated and driven over theſe by the ambient fluid, the ſubſtance of the column has been form'd. In this ſpecies, as alſo in ſome others, there is ſometimes found a drop of clear water, enclos'd pretty deep in the ſubſtance of the column; this I have before obſerv'd, has been occaſion'd by the unequal flowing of the matter of ſeveral ſucceſſive plates, which being near their utmoſt extent, here have run irregularly; and ſurrounding a ſmall ſpot, as water will be often ſeen to do on a ſmooth glaſs, have left it a hole, and that neceſſarily full of the fluid in which the column was form'd, till a larger quantity of added matter ſpreading itſelf over it, and covering the whole, has enclos'd the water and all the ſucceſſive plates, running alſo evenly over this now ſmooth ſurface, have lock'd it up for ever in the ſubſtance of the column. The columnar planes of this ſpecies give very frequently teſtimonies of the matter being thus unequally dilated, and often ſurrounding vacant ſpecks, ſince in many of the ſpecimens of it, the additional matter has not even on its ſurface run in regular flakes, or made even tranſverſe ſtreaks, but has been dilated in a crooked, wav'd form, and frequently leaves ſmaller and larger vacant ſpaces depreſs'd below the common level, by the thickneſs of ſix or ſeven cruſts; and which, had the addition of new matter to the column continu'd, wou'd have been hereafter clos'd over by larger and farther dilated cruſts, and neceſſarily thus have enclos'd water in them.

This is ſeldom found abſolutely ſingle, nor ever in ſuch large cluſters as the ordinary kind; it is of a very elegant brightneſs, perfectly tranſparent, and of a fine water; its pyramid is brighter, as it is indeed in all the other ſpecies, than the reſt of the body; and the lapidaries are cunning enough to cut off that part for their white Sapphires, as they call them.

It is conſiderably heavy, and of extream hardneſs.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very ſlowly to a pure white.

Examin'd by the Microſcope, its columnar planes make a very elegant appearance, the flakes, of which the tranſverſe and irregular ſtreaks are the edges, are perfectly diſcernable, and found to be of very different thickneſſes, and the ſtructure of Cryſtal is no where ſo evidently diſclos'd as in them.

It is frequent in the Eaſt and Weſt Indies, and is found in Germany; and as it is ſaid, ſometimes in England, tho' it has never yet been my fortune to meet with a ſpecimen truly of it here.

It is ſubject to the various tinges of the colours of the Gems as the other, but more rarely; when it is, it very much approaches to the nature of the Gems themſelves; and there is now in London a yellow ſtone cut of it, which who however buys for a Topaz, will be but very little injur'd by the miſtake.

3. *Ellipomacroſtylum hebes, albidum, pyramide breviſſima.*
Dull, whitiſh Ellipomacroſtylum, with a very ſhort pyramid.

This is a very coarſe Cryſtal, but is a very ſingular and obſervable kind; it is of a remarkably impure, coarſe and irregular texture, not foul'd as the common Cryſtal frequently is, by films or clouds of an opake white, but render'd dull and opake by a diffuſion of one continu'd whiteneſs thro' the whole ſubſtance. It is, when ſingle, which indeed is not uſually the caſe, of a very regular and very conſtant figure. It is compos'd of twelve planes, in an hexangular column, adhering irregularly at one end to ſome ſolid body, and terminated at the other by a very regular hexangular pyramid. It is uſually long in proportion to its thickneſs in the column; but tho' this be long and ſlender, the pyramid is always ſhort, broad and ſquat; it is of various ſizes, from a quarter of an inch to four inches, but rarely exceeds that ſtandard; its pyramidal planes are ever very nearly equal in length and breadth, and are all regular ſhort pyramids with broad baſes; if nicely examin'd, four of them, however, will be always ſound a little broader and a little longer than the other two; ſo that the circle that marks the junction of the pyramid and column is not perfectly even; theſe are of very ſmooth and even, and ſomewhat gloſſy ſurfaces; the columnar planes propagated from theſe, ever anſwer them very regularly in breadth, and are very deeply ridg'd with ſtrait tranſverſe lines, and are of very little brightneſs or tranſparence; the root, as the lapidaries call it, that is, the opake part of the column which joins it to its matrix, is very long in this ſpecies, and often runs up half the length of the column. This has no tranſverſe ſtreaks, is very opake, and has but little of a cryſtalline appearance; but the ſurfaces of the reſt of the columnar planes, ſhew themſelves moſt evidently to be compos'd of multitudes of flakes of different thickneſſes, propagated from the pyramidal planes they are affix'd to, and driven down them to different diſtances, according as the quantity or degree of hardneſs of the ſeveral acceſſions of matter wou'd permit.

It is ſometimes, tho' rarely, found ſingle; more frequently it is met with in large cluſters or congeries of various forms, in which the ſhape of the pyramids is only diſtinguiſhable, the columns being variouſly blended one with another, and commonly very imperfect.

This is far from being peculiar to this ſpecies, it is an accident common to many; and frequently there has in theſe maſſes, as in the roots of ſome of the ſingle columns, been nothing of the regular ſtructure of the cryſtalline columns, but a debas'd Cryſtal, concreting in a maſs ſomething like what would have been its natural form, if pure, but in large concretions, and a confus'd order; and the tops of theſe maſſes are only regularly form'd, and of a ſomewhat purer Cryſtal; the laws of attraction may very naturally have effected in theſe caſes, the making freſh concretions of cryſtalline matter, affix themſelves rather to this already concreted foul Cryſtal, than to any other body; and the ſurfaces of ſome of theſe maſſes are cover'd with pyramids, affix'd to no regular columns at all, but having the matter that wou'd have form'd the planes of ſuch, rudely aggregated in various thickneſſes about their baſes: this is an obſervation a perſon much converſant among the complex cryſtalline maſſes, cannot but have often made, and which ſtill greatly confirms the account of the true origin and formation of all regular Cryſtals.

This ſpecies is moderately heavy, and leſs hard than moſt others.

It gives fire but difficultly with ſteel.

It will, no more than the reſt, ferment with Aqua Fortis; whence it has plainly no admixture of Spar, but is meerly foul'd by a white earth.

It calcines ſlowly to a pure white.

Examin'd by the Microſcope, the cruſts are beautifully ſeen on the columnar planes, and are of very various thickneſſes; the pyramidal planes are all fair and ſmooth.

It is found in great plenty in Germany, Italy, France and England; all our Cornwall tin mines afford it, and I have received very fair ſpecimens of it from Mr. Simon of Dublin, collected in different parts of the kingdom of Ireland.

4. *Ellipomacroſtylum perlucidum, fuſcum, pyramide longiore.* *Bright-brown Ellipomacroſtylum, with a long pyramid.*

This is a very valuable and very elegant ſpecies of Cryſtal, and is what our lapidaries uſually cut under the name of brown Cryſtal. It is of an extreamly pure, clear and fine texture, and very ſeldom foul'd by any ſpecks, films, or clouds, or ſubject to any other blemiſh. It is ever a very regularly form'd, and perfect body, in form of a long and moderately thick column; it is very various in ſize, much of it being found in columns of an inch, or an inch and half in length, tho' many are found of ſix, eight, ten, or more inches. It is compos'd of twelve planes, ſix on the column, and the ſame number on the pyramid; thoſe on the pyramid are often very irregular in ſize, two or four of them being frequently more than twice as long, and broad as the others; and the columnar planes falling in an even range with them, the point of this, as of many other ſpecies, often ſtands very far from the center of the column. The pyramidal planes are all extreamly ſmooth and polite, and of a very remarkable gloſs, no flaw or blemiſh, or even the leaſt irregularity being generally to be ſeen on them; it is not unuſual, however, for the columnar planes to be found very rugged, rough, and irregular, from the cryſtallizations of Spar Pyritæ, ſmall Cryſtals of other Genera, and other ſuch bodies being affix'd to them; but theſe are merely accidental acquiſitions; when free from all theſe, they are generally very ſtrongly ridg'd tranſverſly, by the different edges of the plates or cruſts of which they have been form'd, and ſhew very diſtinctly and indiſputably the true formation, and the certain and invariable manner of accretion of columnar Cryſtals; the pyramids in this ſpecies are commonly conſiderably long, and the thickneſs at the top of the column not being over-proportion'd to its length, the planes are uſually pretty long and narrow pyramids; the root is uſually ſhort in this ſpecies, and there are inſtances of its being abſolutely wanting.

It is uſually found ſingle, tho' not always ſo; ſmaller columns are not unfrequently found affix'd to the larger, and ſometimes cluſters of columns have been met with together. It is of a very elegant, clear and fine brown, extreamly tranſparent, and of a fine deep water.

It is very heavy, and extreamly hard.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines difficultly but to a pure white.

The Microſcope is not neceſſary to the examination of this body; its columnar planes, however view'd by it, make a very elegant appearance, and ſhew the different orders of the plates they were compos'd of, with great plainneſs.

It is found in the Eaſt and Weſt Indies, as alſo in Sileſia and Bohemia, and ſometimes in England; there has of late been ſome extreamly fine brought over from the iſlands on the Scottiſh ſhore, where it is ſaid to be found in very great abundance.

5. *Ellipomacroſtylum fuſcum hebes, pyramide brevi.*
Dull-brown Ellipomacroſtylum, with a ſhort pyramid.

This is a ſpecies too often confounded with, and miſtaken for the former, to the no ſmall damage of the purchaſer; the people who ſell quantities of brown Cryſtal, are always cunning enough to mix it among the other, and few purchaſers are careful enough to attend to the difference, till it ſhews itſelf in the cutting. It is of a moderately fine and clear texture, and of a tolerable brightneſs for the generality of Cryſtal; but for brown Cryſtal, or in compariſon to the other, is properly call'd dull and dead in its aſpect. It is a very perfect and regularly form'd column, always ſlender in proportion to its length, and of various ſizes, from half an inch long, to ten, twelve, or fourteen inches. It is compos'd of twelve planes, ſix making up the pyramid, and ſix more the column it is affix'd to. The pyramid is ever ſhort, and of conſequence the planes that compoſe it are ſhort and broad; they are extreamly irregular, even in the manner of their variations, and are ſometimes two, ſometimes three, ſometimes four of them larger than the others, and ſometimes one only is ſmall and narrow. The columnar planes propagated from, and affix'd to theſe, are all very regularly of the ſame breadths with them, and the root, or opake bottom of the column, is uſually long, and reaches a conſiderable way up. The pyramidal planes are very ſmooth, gloſſy and polite, and the columnar very regularly ridg'd with tranſverſe lines; tho' in this, as in many other ſpecies, the different ſides of the column are not at all regularly ridg'd, nor do the lines ſeem at all continu'd from one ſide or plane of the column to another.

This is an obſervable variation in the columnar planes, and is the more diſtinguiſhable in the larger columns of this ſpecies, from the thickneſs of the ridges, the imperfect tranſparence of the whole column, and other reaſons; yet it is, if carefully attended, punctually the ſame, and really diſtinguiſhable in all the ſpecies without exception; the ſtreaks of every columnar plane never really being continu'd to, or joining with thoſe of the next plane, but each plane having its own ſeparate order of them, and this is a farther proof of what has been before obſerv'd, that every columnar ſurface is really compos'd of plates propagated from the pyramidal plane it adjoins to; and that the new matter added for the encreaſe of the already form'd cryſtalline column, is not regularly diffus'd round the top of the pyramid, except in ſome few particular inſtances, of which in their place; but that the uſual courſe of nature is to affix it to one plane of the pyramid only, whence the ambient fluid drives it down to the formation of the columnar one propagated from that plane; and ſo at other times forms the others; and this is plainly the reaſon why one plane both on the pyramid and column is frequently in moſt ſpecies larger than another.

This ſpecies is moſt frequently found in cluſters, but the columns not adhering to one another; it is greatly inferior in brightneſs and tranſparence to the former, but may paſs for a tolerably clear ordinary Cryſtal; it is of various degrees, of brown, ſometimes extreamly pale, and at others very near black, and is often ſtain'd or ſpotted with black clouds.

It is moderately hard, and heavy.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very difficultly.

Examin'd by the Microſcope, it ſhews the nature and order of its conſtituent cruſt very beautifully and diſtinctly.

It is found in great plenty in Germany, adhering in the manner of moſt of the ſpecies of this order, to the ſides of the perpendicular fiſſures of rocks in the mountains. I don't know that we have of it in England.

6. *Ellipomacroſtylum fuſcum, lucidum, pyramide brevi.*
Bright, hexangular, brown Ellipomacroſtylum, with a ſhort pyramid.

This a ſpecies ſubject to various tinges, and is what our jewellers have of late learn'd to ſell by the name of the Saxon Topaz when cut: it is frequently indeed of a pale yellow, but even when it is not, they uſe the word Topaz ſo far a technical term in regard to it, as ſtill to call it ſo.

It is a very elegant and beautiful ſpecies, of an extreamly pure, clear and fine texture, and very ſeldom found with blemiſhes within, tho' frequently and indeed generally cover'd with a very rough and ſomewhat opake and dull external coat; it is a very regular and perfectly form'd body, always found in a ſlender and long hexangular column terminated by a ſomewhat ſhort hexangular pyramid; it is of various ſizes, but moſt frequently of about two inches in length, and ſomewhat leſs than half an inch in diameter, tho' ſometimes of a little more than this thickneſs in the ſame length; its pyramidal planes are very irregular and unequal in ſize, and very uncertain even in the manner of their varieties, two, and ſometimes four of the planes being much longer and broader than the reſt; the ſurfaces of theſe are ſometimes free from their common cruſt, and are then extreamly ſmooth and polite, but oftner that is extended quite over them, and makes them appear rough, foul and opake; and from their being defective in ſome ſpots, the laminated ſtructure even of theſe cruſts is diſtinguiſhable, tho' they are not ridg'd; a thing that very ſeldom happens in any of the ſmooth and naked ſpecies; the columnar planes that are join'd to theſe, are always exactly of their breadth, they are uſually of the ſame rough and opake ſurface with thoſe of the pyramids, but are generally as deeply and remarkably ridg'd as thoſe of almoſt any other ſpecies; the ridges in theſe as in the other ſpecies, are not propagated round the column, or at all join'd to one another, but all compos'd plainly of the edges of ſeparate plates, employ'd only in the ſtructure of the cruſt of one flat plane; the ridges in theſe cruſts are uſually very ſeparate and diſtinct, and the view may the more eaſily by that means be continued to two ſeries of them on two adjoining planes; which as each requires a diſtinct point of light to be ſeen in, is not ſo eaſy where the ſurfaces are more polite, or the lines of the ridges more cloſe and fine; the root, or opake part of this ſpecies is uſually ſmall; it is frequently found ſingle, tho' ſometimes in large cluſters, but ſeldom with the columns conjoin'd, or running into one another; it is notwithſtanding its rough coat, when broken, of an extream brightneſs, a fine tranſparence, and elegant deep water; its natural colour is a very elegant pale brown, and it is very often found of this colour without its rough coat, and perfectly bright as the fineſt of the other Cryſtals; it is the moſt of all the known ſpecies of Cryſtal ſubject to be colour'd by various metalline tinges, principally thoſe of lead and iron, and is thence found oftner reddiſh or yellowiſh than of its own natural colour; and ſometimes when colour'd, is ſtill ſmooth on the ſurface, and makes a very elegant appearance.

It is conſiderably heavy, and extreamly hard.

It gives fire very freely with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very difficultly, but always to a pure white.

Examin'd by the Microſcope, its cruſted texture is very elegantly diſcover'd, and its cruſts ſeen to be thicker than in moſt other Cryſtals.

There is this great ſingularity alſo attending theſe, and the cruſts of ſuch other ſpecies as have cruſts, which is that the matter of which they are compos'd, has ever been added to the lower part of the columnar planes, and thence propagated upwards in a contrary direction to the conſtituent cruſts of the Cryſtal columns themſelves; and thence this covers the pyramidal planes, as imperfectly as in the other caſes, what is propagated from thoſe planes does the columnar.

It is found in Saxony, particularly at the great mine at Goſſelaer, from whence moſt of that us'd in England has been ſent: Captain Preſton, a few days ſince, preſented me with ſome fair ſpecimens of it which he had himſelf collected in Virginia.

7. *Ellipomacroſtylum lucidum, fuſcum, pyramide longiſſima maxime irregulari; quod Gemmariis quibuſdam Beryllus audit.*

Bright, brown Ellipomacroſtylum, with a very long irregular pyramid, call'd the Beryll by ſome Jewellers.

This is a very ſingular and beautiful ſpecies, and is the moſt vivid in its reflections of all the brown Cryſtals, but is always found ſmall: It is of an extreamly pure, clear, fine and equal texture, and ſcarce ever ſubject even to the ſlighteſt films, clouds, or blemiſhes; it is ever conſtant to the peculiarity of its figure, which is that of a long and ſlender column, remarkably tapering toward the top, very irregularly hexangular, and terminated by a remarkably long, but irregular pyramid; it is found from half an inch to four inches in length, but very ſeldom exceeds that ſtandard, and is thinner than moſt other Cryſtals in columns of the ſame length; and is ſo remarkably tapering toward the top, that it is not unuſual to find the column of twice the diameter near the root, that it is where it joins the pyramid. It is compos'd of twelve very irregular planes, ſix on the column and ſix on the pyramid; thoſe on the latter are uſually two, ſometimes three, of an extream length in compariſon with the reſt, and of a proportionate breadth at their baſes; the other three, or four, are never any two of them of the ſame length, but uſually one of them is ſo extreamly ſmall, as not to be of a third part either of the length or breadth of the larger planes; and the point, or ſummit of the pyramid never ſtands any thing near the center of the column: from the planes of the pyramid are propagated as many, and thoſe of the ſame breadth on the column; the broadeſt of which, however, being propagated from the broadeſt of the pyramidal ones, which are the longeſt alſo of theſe, are here neceſſarily the ſhorteſt; and the narroweſt of theſe having to run to the baſe of the ſmaller pyramidal planes, are greatly the longeſt; this is neceſſarily the caſe in all the columnar Cryſtals with irregular pyramidal planes, but is from the great irregularity of theſe, particularly obſervable in this ſpecies.

The ſurfaces of the pyramidal planes are extreamly gloſſy and of a very remarkably vivid and bright reflection, ſo much ſo indeed as to be a mark alone ſufficient for the diſtinction of the ſpecies; for it gives in this part very nearly all the colours of the diamond in reflection, tho' without the force and fire of that Gem; its columnar planes are not without this character alſo in their ſhare, and are ever perfectly clear, ſmooth, and fine, nor much leſs gloſſy than the others; ſtrictly examin'd, however, they are found not to want the ordinary traces of the ſtructure of the columnar Cryſtals, but are very finely ſtriated tranſverſely; their lines being extreamly ſlender, cloſe, and appearing not as ridges, as they truly are in all, and as they plainly appear to be in moſt, but looking like ſo many extreamly fine ſtrokes drawn under the ſurface with a pencil; the root as the lapidaries call it, in this ſpecies, is extreamly ſhort: it is uſually found ſingle, or at the utmoſt ſeldom in larger cluſters than three or four together, and thoſe always diſtinct and ſeparate, never cohering, or even touching one another; it is of a very fine tranſparence and ſingularly bright water, and is naturally of an extreamly pale brown, but when poliſh'd in the brilliant cut, it in a great meaſure loſes its own colour in the many that it gives in reflection.

It is remarkably heavy, and very hard.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very ſlowly.

It is found in Italy, and ſome parts of Germany. It carries ſo evident marks of diſtinction from all the other brown Cryſtals, that our jewellers never fail to know it; they are very fond of it in Italy, and call it uſually, by way of eminence and diſtinction, the Beryl Cryſtal: Our lapidaries have learnt its value from them, and loſing its genuine name, call it, (as they do alſo the Beryl cornelian,) ſimply the Beryl; whence it had a few years ago generally prevail'd in London, that this was the Beryl, or proper Gem of that name; and every jeweller being willing not to be without that Gem, and this kind, or the true Beryl Cryſtal of the Italians being ſcarce, any other good brown Cryſtal was cut to ſupply its place, and brown Cryſtal in general, was vulgarly accounted the Beryl of the antients; nor was this cuſtom indeed confin'd to England alone, for De Boet expreſly mentions it, and that of this very ſpecies, his words are, *Cryſtalli qui in agro Piſano inveniuntur ac raro digiti magnitudinem accedunt Iridis colores Angulorum repercuſſu imitantur. Ob quam cauſam à Gemmariis adamantum inſtar ſcalpuntur ac Berylli nomine tanquam præſtantes Gemma divenduntur. Eſt tamen Beryllus alia Gemma.*

8. *Ellipomacroſtylum albidum, pyramide longiſſima, quod Iris authorum.*
Whitiſh Ellipomacroſtylum, with a very long pyramid, the Iris, or Rain-bow Cryſtal of authors.

Authors have not properly underſtood one another about the Iris, moſt of them particularly of the later, following Agricola, call all the hexangular Cryſtals by this name; but the more careful diſtinguiſhers have only call'd it by one kind of Cryſtal, and by their deſcriptions, and by the effects upon experiment, it appears to be this very kind; Iris Cryſtalli ſpecies eſt, and Iris minus pellucida Cryſtallis, are its common characters among the moſt accurate authors; nay, the careful De Boet, more memorable indeed for his induſtry than his genius, has not omitted them. Its variety of angles from the irregularity of the breadth of its planes, and its very foulneſſes, make it more than all other ſpecies of Cryſtal, famous for giving a variety of colours either in its reflections or refractions.

It is of a moderately fine texture, but naturally of a ſomewhat foul, or whitiſh caſt, and extreamly ſubject to films, clouds, and large white flaky blemiſhes, which reflect ſometimes in a vaſt many places at once, all the colours of the Rainbow; and this was probably the occaſion of its name, as the other experiment of its giving the priſm colours by refraction in a dark room, was a much leſs obvious property, and a thing not likely to have been look'd into in regard to it in the times when it obtain'd it. It is of a perfect and regular form, and ever found in the ſhape of an hexangular column, terminated by an hexangular pyramid; it is uſually long and ſlender, and is found of various ſizes, from one inch to ſix or eight in length; but its uſual ſtandard is about three inches; it is compos'd of twelve irregular planes, ſix on the pyramid, and as many on the column; the pyramid is very remarkably long and ſlender, but its planes are of ſo very different extent, that ſome of them may be juſtly term'd very broad as well as very long in proportion to the others; two, three, or four of them, which number is perfectly uncertain, are of three times the length and diameter of the reſt; the ſummit of the pyramid, is very far from ſtanding in the center of the column, and the line that deſcribes the inſertion of the column to the pyramid, ſtrangely irregular; the columnar planes are propagated one from each of theſe, and are each of the ſame breadth, or nearly ſo with that of the pyramid to which it joins; their lengths on the contrary are neceſſarily different, the ſhorteſt columnar plane being naturally that join'd to the longeſt pyramidal one, and the longeſt that propagated from the ſhorteſt on the pyramid, as it muſt be in this and all the other ſpecies with irregular pyramids.

The ſurfaces of the pyramidal planes are conſiderably ſmooth and polite, but they are not without blemiſhes in ſome of the ſpecimens, eſpecially the larger, which have frequently flaws, prominent ſpecks, or cavities in them; the columnar are very plainly ridg'd, but the lines are ſmall, and placed at conſiderable diſtances, the root in this ſpecies is uſually long and large; it is commonly found in cluſters, of forty, fifty, or more together, but the columns rarely cohere or touch one another; it is of a pale white colour, and even in the planes where it is perfectly free from flaws, is but of a moderate degree of brightneſs or tranſparence; it is rarely found ting'd with any other colour.

It is moderately hard and heavy.

It gives fire very freely with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very readily for a Cryſtal, to a pure white.

Examin'd by the Microſcope, its ridges on the columnar planes appears evidently as in the reſt, the edges of a number of extreamly thin plates, or cruſts, of which the column is compos'd; its pyramidal planes, where they have flaws that divide the cruſts, or make cavities, as is not unfrequently the caſe, ſhew themſelves alſo to be of the ſame laminated ſtructure, tho' the Lamina are always ſo perfectly extended over them as not to be ſeen in ridges.

It is found in very great quantities in Germany, Italy, and England, adhering as the reſt, to the ſides of the perpendicular fiſſures in quarries of ſtone.

9. *Ellipomacroſtylum lucidum, flaveſcens, pyramide brevi, quod Citrinus Gemmariorum.*

Bright, yellow Ellipomacroſtylum, with a ſhort pyramid, the Citrina of the Jewellers.

This is a very ſingular and extreamly beautiful ſpecies, and never found otherwiſe than of this beautiful yellow; its peculiar characters make it evidently a diſtinct ſpecies, and the judicious naturaliſt would indeed determine it to be ſuch of whatever colour it were; but it is ſomething remarkable, that as moſt of the naturally colourleſs Cryſtals are at times found ting'd with various dyes, and even the colour'd Gems are ſometimes found without their tinge, this remarkable Cryſtal is never found colourleſs, or without more or leſs of its yellow, as far as has hitherto been obſerved; one might be apt to ſuſpect from this, that the very ſpecific difference and ſhape of the Cryſtal, was owing to the matter that gives the colour; but as we know that colour can be only from lead, and that this metal, if it influenced the ſhape of the body, muſt give a very different one from what it has, this ſuſpicion cannot be ſupported.

It is of an extreamly pure, clear, and fine texture, and is ſeldom foul'd with flaws, or other blemiſhes; when it has any, they are of the nature of the flaky ones of the Iris, and ſome other ſpecies; and are of a paler yellow, more opake than the body of the Cryſtal, and give the rain-bow colours in their different reflections; it is ever found in a long and ſlender column, irregularly hexangular, and teminated by an hexangular pyramid, remarkably ſhort, and compos'd of very irregular planes; it is of various ſizes, from one to four or five inches in length, and is generally much thinner at the top than near the root; its pyramidal planes are, tho' all very ſhort, yet differently ſo, and of very different breadths; the line that deſcribes their joining with the column is far from even, and the planes of the column propagated from them, are as in the reſt, frequently exactly of their breadth, but ſometimes a little broader, or a little narrower; the ſurfaces of the pyramidal planes are ever perfectly ſmooth, even, and free from flaws, thoſe of the column are remarkably bright and gloſſy, but if attentively examin'd, they are found to be ridg'd with an almoſt innumerable multitude of fine ſmall lines, or ſtreaks, for they appear no other, laid as cloſely and evenly together as the Zones of the Oriental Sardonyx when fineſt.

It is ever found ſingle, or very nearly ſo, two or three being the largeſt cluſter found together, and theſe never touching one another; it is of an extreamly beautiful yellow; and of very elegant brightneſs and tranſparence; it is ſubject to no other than its natural tinge, but has that in very different degrees from a ſtrong Ochre colour to that of the peel of a Lemon.

It is moderately hard, and heavy.

It gives fire very freely with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very ſlowly, but to a pure and perfect white, which is a proof that its tinge is not earthy but metalline.

Examin'd by the Microſcope, its whole texture appears extreamly fine, and its colour very elegant, the lines on its columnar planes appear as in the reſt, the edges of ſo many plates or cruſts of which they have been form'd.

It is very plentiful in the Weſt Indies, and is found in ſome parts of Bohemia, and ſometimes in other countries: Our Jewellers have learnt from the French and Italians, who are very fond of it, to call it Citrine, and often cut ſtones for rings out of it, particularly from the pyramid; which after they have paſſed thro' two or three hands, are generally miſtaken for Topazes.

10. *Ellipomacroſtylum pyramide brevi, cruſta ſcabra rubente: Ellipomacroſtylum, with a ſhort pyramid, and a thick reddiſh cruſt.*

This is a very ſingular ſpecies, and always readily diſcovers itſelf to the obſerver, by its remarkable ſcabrous coat. It is internally of an extreamly fine, equal and pure texture, perfectly colourleſs, and of a fine water, and ſubject to no foulneſs, or blemiſh whatever, in the greater part of its ſpecimens; thoſe which have any, have them of the ſame flaky kind with the Iris, of an opake white; and giving, as in that, all the colours of the rainbow in their different reflections. It is a perfect and very regularly form'd body, ever found in form of an hexangular column, conſiderably thick at the baſe, gradually tapering toward the top, and terminated by a ſhort irregular pyramid; it is of various ſizes, from two inches to ſix or eight in length, but is moſt uſually found of between two and three inches. It is compos'd of twelve irregular planes, ſix on the pyramid, and as many on the column. The pyramidal planes are extreamly irregular in ſize and ſhape, ſome very ſhort, others of conſiderable length, and ſome very remarkably broad, while others of the ſame length are very narrow: They are uſually, however, three much longer than the reſt, and theſe, tho' of different breadth, commonly pretty nearly of the ſame length, the others are much ſhorter, and very irregularly ſo, one being much ſhorter and ſmaller than the other two.

This is the general ſhape of the pyramid, and it uſually keeps very regularly to it, but there are in this, as in all the reſt, too frequent variations from it; all that a deſcriber can attempt is, to give its moſt uſual conſtruction, varieties from which in particular ſpecimens are always to be expected. It is, however, always compos'd of irregular planes, and is ſhort in proportion to the length of the column. The columnar planes propagated from theſe pyramidal ones, are uſually tolerably exactly of their reſpective breadths. The ſurfaces of both theſe and the pyramidal are extreamly dull and opake; thoſe of the pyramidal planes are naturally of a ſomewhat ſmooth ſtructure, but they are uſually full of blemiſhes, cracks, fiſſures and cavities; the columnar are ſcabrous and unequal, in a degree not eaſily to be match'd in the Cryſtal Claſs; their very inequalities, however, ſhew their ſtructure; for they are all the tranſverſe traces of the edges of the ſeveral cruſts that have compos'd them, tho' ſometimes ſo broken and interrupted, that it is not eaſy to ſee which way they have been carry'd, till they are trac'd up to their origin, at the baſe of that plane they were propagated from; but there it always appears, that they have been carry'd from that to different diſtances, toward the point or pyramid at its top, that being always the direction of the matter of theſe cruſts, contrarily to that of the true matter of the columns. It is very ſingular that the laſt cruſts of this ſpecies are extreamly different from the matter of the reſt, they are all of a pale reddiſh hue, very dull and opake, and uſually full of red ſpots, which are ever uniform in ſize and ſhape, ever very ſmall and round; theſe ſeveral cruſts all joining in one maſs, make a coat for the whole column, equally covering it every way, and uſually about one twelfth of an inch thick.

The cruſts which compoſe this adventitious coat as in that of the brown Cryſtal call'd the Saxon Topaz before deſcrib'd, ever running the contrary way to thoſe which compoſe the columns themſelves in Cryſtals; and being made of a coarſer matter depoſited on the baſes of the columnar planes near the root of the column, and thence propagated to the top, and ſpread over the planes of the pyramids, where they are always diſtinguiſhable alſo from thoſe of the pyramids themſelves, which are ever originally lodg'd there, thoſe being always ſmooth and perfectly even; theſe, on the contrary, as conſtantly and certainly ſcabrous, rough, cavernous, or imperfect; and that is from this plain cauſe, that where the additional matter is firſt affix'd, and is to be dilated from, the place is always evenly, perfectly, and regularly cover'd by it; where it ſtops, and is deficient in quantity, and too far concreted to be extended farther, it is natural to think, it muſt be but unevenly extended, and have the uneven ridges on the true columns of Cryſtals, and theſe inequalities muſt here be on the pyramidal planes of theſe adventitious cruſts.

It is ſeldom found ſingle, generally two, four or more columns, growing in a cluſter together; and theſe often attended by a number of ſmall ones, and not unfrequently adhering ſlightly to one another, and leaving very irregularly cavernous and protuberant ſurfaces where broken aſunder. It is a very valuable Cryſtal, very clear and bright, and of a fine black water; and tho' its cruſt is often very red, is ſcarce ever at all ting'd with that colour in its ſubſtance.

It is conſiderably heavy, and very hard.

It freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very ſlowly and difficultly to a pure ſnow white.

Examin'd by the Microſcope, its inner ſubſtance appears extreamly bright, and of a perfectly elegant ſtructure. Its cruſt, carefully examin'd, is found to be of an impure and opake Cryſtal, but no where, properly ſpeaking, ſtain'd or ting'd with red. The round red ſpots ſo frequent in it, are ſpecks of a very beautiful purpliſh iron ore; and the places where they are not diſtinguiſhable to the naked eye, examin'd with this help, appear all over full of extreamly ſmall ſpecks of the ſame matter, making a confus'd appearance of redneſs, and giving a ſeemingly continu'd tinge of that colour throughout the parts of the maſs where they lie, and indeed in this much reſembling the veins of ſome of the oriental Sardonyxes; which tho' extreamly minute, and ſeeming continu'd lines of red to the naked eye, are yet diſcovered by the Microſcope to be only numerous ranges of the like red ſpots.

It is found in Germany, Italy, France and England; the firſt ſpecimen I ever ſaw of it was given me by Mr. Baker, who received it from Cornwal. I have ſince met with it ſeveral times among the Cryſtal to be ſold for the lapidaries uſe, and have received accounts of its being found in great quantities, in the mines of Goſſelaer, in Saxony.

SERIES III.

CLASS III. ORDER III. GENUS II.

ELLIPOPACHYSTYLA.

CRYSTALS compos'd of twelve planes, in an hexangular column, terminated by an hexangular pyramid at one end, and irregularly affix'd to ſome other body at the other, with ſhorter columns.

1. *Ellipopachyſtylum brevius, lucidum decolor.*
Short, bright and colourleſs Ellipopachyſtylum.

This is a ſpecies of Cryſtal ſo remarkably ſhort in proportion to its thickneſs, that it carries in that epithet alone a ſufficient diſtinction from all the other bodies of the Cryſtal claſs. It is of an extreamly pure, clean and fine texture, and generally perfectly free from clouds, ſpots, films, and all other blemiſhes. It is very conſtant in its figure, and ever is a very thick and extreamly ſhort column, pretty regularly hexangular, and terminated by a moderately long and very regularly hexangular pyramid. The planes of the pyramid, are four broader, and two narrower pretty conſtantly; but the difference between the broadeſt and narroweſt is ſo inconſiderable, that they might paſs on a curſory obſerver, for equal ones; they are very nearly all of a length, and the line that marks their joining with the column, is in conſequence pretty even: The ſurfaces of theſe are perfectly ſmooth, even and polite; the columnar planes are ſeverally propagated from theſe, but are not ſo regular in breadth, as might be expected; ſome of them from a large quantity of matter driven from their pyramidal planes, ſwelling a little beyond their proper breadth, and intrenching upon the others, tho' on the whole with this irregularity, it is generally an equaller column than moſt others. It is found of various ſizes, from half an inch to three inches in length, and is uſually of two thirds of its length in diameter, and the length of its column not ſo much as half that of its pyramid; the columnar planes are evenly and regularly ſtriated; the lines being very fine and ſmall, are not eaſily diſcernable, but an examiner who knows how to look for them, will never fail to find them; they are ever exactly and evenly tranſverſe to the direction of the column, and are rang'd very cloſe to one another. The root in this ſpecies is very ſmall and inconſiderable, and is not ſo coarſe and opake as in moſt other kinds. It is uſually found in cluſters of eight or ten together, but the columns ſeldom touch, and never adhere to one another; it is perfectly colourleſs as the pureſt water, and of a very elegant brightneſs and tranſparence. It is at times ſubject to the ſame metalline tinges as the other Cryſtals, and when it has them is much valu'd.

It is moderately heavy, very remarkably hard, and capable of an elegant and high poliſh.

It very freely gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It calcines very ſlowly and difficultly to a pure white.

Examin'd by the Microſcope, its lines on the columnar planes, tho' very fine and cloſe, are plainly enough diſcover'd to be the edges of ſo many flakes or cruſts, which have been propagated from the reſpective pyramidal planes above, for the ſtructure of the column.

It is found in great plenty in New Spain, and ſome other parts of America; but not in Europe, ſo far as I have yet heard.

2. *Ellipopachyſtylum brevius, hebes ſordide-fuſcum.* *Short, dull, duſky-brown Ellipopachyſtylum.*

This is a ſpecies as remarkably ſhort as the former, but its pyramid being ſhort in proportion to its column makes the ſhortneſs of that the leſs remarkable; it is of a foul, impure and coarſe texture, and frequently full of clouds, films, and large ſpots of black. It is of a very regular and certain figure, always a ſhort and very thick column, terminated by a ſhort and very irregular pyramid. It is of various ſizes, and often extreamly ſmall; but its uſual ſtandard is about an inch and half in length, and nearly of two thirds of its length in diameter. It is compos'd of twelve irregular planes, ſix on the pyramid, and as many on the column. The pyramidal ones are all ſhort and broad, but two of them are uſually much broader, and a good deal longer than the reſt; the columnar planes propagated from theſe, are pretty nearly of the ſame breadth with them, and of conſequence are, as they are, two broader than the other four; the pyramidal are of perfectly ſmooth and even ſurfaces, and the columnar as plainly and ſtrongly ridg'd and ſtreak'd as in any ſpecies I know; the ſtreaks run directly tranſverſe, and are very few in number, but uſually very prominent, and readily diſcover themſelves to be the edges of ſo many plates. One thing there is which one not unfrequently meets with in this ſpecies, and ſometimes in others, which might give one a wrong idea of the courſe of theſe plates; which is, that the ſubſtance of this Cryſtal having been broken off, thro' a conſiderable number of its cruſts, from the upper part of one of the columnar planes toward the pyramid, that whole thickneſs has gone off together, and broad ſurfaces of the plates remaining on below, has look'd like a very thick cruſt, propagated the contrary way, and as the rough coats of ſome Cryſtals, dilated from the baſe toward the pyramid; the Microſcope, however, always clears up this difficulty, and often the naked eye, for the edge of the pyramidal planes examin'd, as that never goes off with the fragment, always ſhews the broken edges of thoſe cruſts which were once continu'd to, and join'd with thoſe of the oppoſite edge. This has, like the former, very little root, and what it has, is very little different from the reſt of the maſs of the column. It is of a very diſagreeable and duſky brown, and has leſs brightneſs and tranſparence than moſt other ſpecies.

It is moderately heavy, and not ſo hard as moſt other Cryſtals.

It ſtrikes fire, but not ſo freely as the finer kinds, with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines, tho' but ſlowly, and not to a pure white, but to a ſort of pale fleſh colour; this is a proof that its colour is not owing to metalline, but earthy particles, as might well be ſuſpected indeed from its duſkineſs.

The Microſcope ſhews it to be of exactly the ſame ſtructure with the other columnar kinds, and it is one of them indeed in which that ſtructure is moſt diſcernable.

It is found in Germany in great plenty, and is ſometimes met with in England; I have ſeen of it in Yorkſhire, and hear people frequently talk of a dull and brown ſort of Kerry ſtone, which, by what deſcription I can get of it, ſeems the very ſame ſpecies.

SERIES III.

CLASS III. ORDER III. GENUS III.

OLIGAEDRA.

CRYSTALS *with ſingle pyramids: decahaedral, conſiſting of a pentangular column, with a pentangular pyramid.*

1. *Oligaedrum albidum, pyramide brevi.*
Whitiſh Oligaedrum, with a ſhort pyramid.

This and the two following, as well as thoſe of the ſucceeding Genus, are ſo different from the common appearance of Cryſtal, and from the common opinion of what Cryſtal ought to be; that were one to have met with only a ſingle ſpecimen of ſome one of them, one would have naturally imagin'd it an accidental Luſus Naturæ; their conſtantly keeping to their figure, however, convinces that they are truly diſtinct Genera and ſpecies; and moſt people, who have at any time made any conſiderable collections of Foſſils, have met with of one kind or other of them.

We are not to wonder if every one who has been poſſeſs'd of one of them, has not been convinc'd of its being a diſtinct Genus of Cryſtal, ſince we are naturally too apt to confine our ideas of things to the bounds of our own narrow experience; and we have an inſtance of a writer of no ſmall fame in theſe ſtudies, who never having ſeen any more than one ſpecimen of the moſt common of all the double pyramidal Cryſtals without columns, took it for a body reduc'd to that form by art.

This is a perfect and regularly form'd body, ever of this certain and determinate figure, of a moderately fine and pure texture, but ſubject to very numerous flaws, clouds, and white opake flakes, which like thoſe of the Iris and other common Cryſtals, give the rainbow colours in reflection. It is ever remarkably thick and ſhort, and its pyramid very broad, but of very little length. It is of various ſizes, from the tenth of an inch to two inches in length, tho' uſually found ſmall; and is compos'd of ten planes, five on the pyramid, and five propagated from them, and making the ſides of the column; theſe are conſiderably irregular in breadth, but always nearly of the ſame length, and in ſome degree regular in their variations; they are always four broader than the other two, both on the pyramid and column; and of theſe four, two in each part are broader than the other two; the columnar planes have always an appearance of anſwering the pyramidal ones, from which they are propagated in breadth; but ſeldom do ſo exactly, one often ſwelling to a breadth beyond its due proportion, and by that means entrenching upon one another on one ſide, if not on each ſide The pyramidal planes are perfectly ſmooth, polite and gloſſy, and the columnar very faintly yet regularly mark'd with tranſverſe ridges, and ſlight ſtriæ; the root or baſe of the column where it adheres to the ſtone, is white and opake, but is very ſhort; it is uſually found in conſiderable cluſters, but the columns ſeldom joined, or indeed touching one another. It is throughout of a dead whitiſh hue, and but moderately bright, or tranſparent, but is very ſeldom found ting'd to any other colour.

It is moderately hard and heavy.

It gives fire very freely with ſteel.

It ferments not at all with Aqua Fortis.

It calcines very ſlowly to a pure white.

Examin'd by the Microſcope, it appears very plainly compos'd of plates, the edges of which ſometimes ſingly, but more frequently three or four together, make the tranſverſe ſtriæ, they are indeed thinner than the conſtituent cruſts of many finer Cryſtals.

It is found in Germany, but I have not been able to learn the particular place; it is ſometimes brought over to us among quantities of Cryſtal to be ſold to the lapidaries.

2. *Oligaedra lucida, decolor, pyramide longiore.*
Bright, colourleſs Oligædra, with a longer pyramid.

This is a very elegant ſpecies, and compos'd of as pure Cryſtal as I have met with in any of the kinds; it is of an extreamly fine, pure and clear texture, and like the reſt of the very fine Cryſtals, is ſeldom found with any of the blemiſhes ſo frequent in the ordinary kinds; it is ever conſtant to its form, and is as regular and perfect a body as the moſt common columnar kind; it is compos'd of ten irregular planes, five on its pyramid, and five propagated from them making the ſides of the column; the column is ever very thick and ſhort, as in the former ſpecies, but the pyramid is here remarkably long, and tapers to a fine point; it is found of various ſizes, but about three quarters of an inch in length ſeems its general ſtandard; it is very ſeldom indeed found exceeding this, but is very frequently extreamly ſmall, the planes both of the pyramid and column, are always three regularly broader than the other two, and theſe pretty equally of the ſame breadth; thoſe of the pyramids from which theſe are propagated are alſo longer than the two narrower, and that irregularly, one of theſe broad ones being always longer than the reſt, and the other two unequally ſo; ſo that the line deſcribing the joining of the pyramid to the column is very uneven; the columnar planes are proportion'd to the length of theſe, the longeſt joining the ſhorter of them, and are very regularly equal in breadth to thoſe on the pyramid which they are propagated from; the ſurfaces of the pyramidal planes are of a moſt elegant poliſh and great brightneſs, thoſe on the columnar are very bright alſo, but are very plainly ridg'd and ſtriated a croſs; the ſtriæ being plainly prominent and at conſiderable diſtances one from another; theſe are ſo plainly the edges of plates propagated from their reſpective pyramidal planes, that the finger nail drawn along them, plainly diſcovers the inequalities they have, and determines their courſe better than a thouſand obſervations; the drawing it down from the pyramid to the baſe meeting with no reſiſtance, but only dropping as it were from ſtep to ſtep; but the drawing it on the contrary up from the baſe toward the pyramid meeting with continual interruptions, and plainly ſhewing the prominence of every edge of the plates; the root is in this ſpecies, very ſhort and inconſiderable; it is uſually found ſingle when of any conſiderable ſize, when ſmaller, whole cluſters are found together, and theſe ſometimes with their columns confuſedly join'd, and injuring one another; it is perfectly colourleſs, extreamly tranſparent, and of a fine deep water.

It is moderately heavy, and very hard.

It will not ferment with Aqua Fortis.

It gives fire very freely with ſteel.

It calcines very ſlowly and difficultly.

Examin'd by the Microſcope, it ſhews the ſtructure of its columnar planes very clearly and beautifully; and it is ſomewhat ſingular, that the plates of this fine Cryſtal are as remarkably thick, as thoſe of the coarſer kind were thin.

It is found in the larger ſingle ſpecimens in Germany, only, ſo far as I can yet learn, but in the cluſters of ſmaller ones; we find it in England in the ſinking to the lead mines on Mendip Hills, and in the tin mines of Cornwall.

3. *Oligaedra fuſca, cortice ſcabro.*
Brown Oligædra, with a ſcabrous cruſt.

This is a ſpecies of very great value and beauty, but promiſes very little from its external appearance; it is neceſſary to view it where broken to diſcover its texture; which tho' cover'd with a rough, coarſe and opake cruſt, appears there perfectly pure, clear and fine; and, as far as I have yet ſeen, not ſubject to the leaſt foulneſs, flaw, or blemiſh; it is a very regular body, ever compos'd of ten planes, five on the pyramid, and the ſame number on the column, and is always like the two former ſpecies, very thick and ſhort, and terminated by a moderately long and ſlender pyramid; its uſual ſize ſeems to be about three inches in length, and near half that in diameter; its pyramidal planes are regularly two very broad, two moderately ſo, and one very narrow; this is a ſomewhat ſingular ſtructure, and gives the whole a very regular and uncommon appearance, as it is always regularly propagated down the column, the columnar planes being ever very regularly of the ſame breadth with the pyramidal; the root is very ſmall and inconſiderable, but the whole column is gradually narrower from this to the pyramid, and is cover'd with a very ſcabrous, rough and cavernous coat, full of ſmall holes uſually containing a yellowiſh Ochre of ferrugineous matter, and giving a yellowiſh caſt to the whole outer appearance of the column; the ſurface of the pyramidal planes is in this as in all the coated kinds, rough, unequal, and uſually full of ſmall irregular cavities; and the columnar very even and regular, full of tranſverſe ſtriæ, but made of the edges of the plates which compoſe it; but theſe diſpos'd in the contrary order to thoſe of the common Cryſtals, the matter of them as of all the adventitious coats of Cryſtals, having been affix'd to the baſe, and thence propagated upwards toward the pyramid, which being therefore cover'd with ſuch of the new matter as had been longeſt depoſited, and perhaps dilated and extended farther than it could well bear, is therefore uſually but imperfectly covered.

It is uſually found ſingle, and is a very valuable Cryſtal, of a very beautiful brown, extreamly tranſparent, and of a fine deep water.

It is moderately heavy, and extreamly hard.

It ſtrikes fire very freely and plentifully with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very ſlowly and difficultly to a pure white.

Examin'd by the Microſcope, the edges of the plates appear extreamly diſtinct, tho' very fine; they are often amaſs'd together in congeries of four or five, manifeſtly blended in many parts of their ſubſtance one with another, and ſeeming to have been extended up the column together, while all were extreamly moiſt.

It is found only in the Eaſt-Indies, and is much valued by our lapidaries, who, tho' they don't give themſelves the trouble of counting the number of its planes, uſually know it very well when they meet with it by its rough coat, and ever account it the fineſt of all brown Cryſtals.

Theſe are the ſpecies yet known of the decahaedral Cryſtals, and as they all agree in the remarkable thickneſs and ſhortneſs of their columns, it ſhould ſeem that this was a peculiarity appropriated to all of the Genus; whether future obſervations of more ſpecies which come in the way of the curious, may confirm or overthrow the conjecture, is not yet to be determined.

SERIES III.

CLASS III. ORDER III. GENUS IV.

PANGONIA.

CRYSTALS with ſingle pyramids; made up of twenty four planes, and call'd by the Greeks, Pangonia. Theſe are compos'd of dodecangular, or twelve plan'd columns, terminated by dodecangular pyramids.

1. *Pangonium albido-fuſcum, pyramide longiore.*
Browniſh-white Pangonium, with a long pyramid.

This is a very ſingular ſpecies of Cryſtal, in its colour as well as in its figure; it is of a moderately fine, pure and clear texture, but commonly ſubject to flaky foulneſſes of a whiter hue than the body of the Cryſtal, and more opake; it is of a very ſingular form, though conſtantly and regularly found in it, and can be accounted no accidental variety or Luſcus Naturæ, ſince there is a very different ſpecies next to be deſcrib'd of the ſame form; and this even if of the ordinary form, muſt, from its colour and texture, have been accounted a diſtinct ſpecies, and add to this that no Cryſtal of this colour and texture ever was found in any other form: It is ever a regular and moderately long and ſlender column, compos'd of twelve irregular planes, and terminated by a long and ſlender pyramid of the ſame number; it is found of about three inches in length, and a little more than half an inch in thickneſs, and is very ſeldom much larger or much ſmaller than that ſtandard; its pyramidal and columnar planes appear both very much as if made by dividing into two the planes of the ordinary hexangular Cryſtal, and are all very irregular in breadth, no particular number of them being regularly or determinately broader or narrower than the reſt; ſome of them always are, however, more or leſs ſo, and it is not unfrequent to find the angles in ſome parts both of the pyramids and columns almoſt obliterated, and a part of the planes wanting, or appearing to be wanting; the ſurfaces of the pyramidal planes are perfectly ſmooth and polite, and thoſe of the columnar, as is uſual in the other kinds, ſtriated tranſverſely; and a careful obſervation will ſhew, that tho' the number of planes is here ſo great, and the ſtriæ ſo fine, yet they are ever peculiar in their arrangement to the very plate they are ſeen on, and are never continued to the next. The root in this ſpecies is long, large and whitiſh; it is uſually found ſingle, and is of a pale whitiſh brown, and moderately bright, and tranſparent.

It is conſiderably heavy, and very hard.

It freely gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It calcines ſlowly to a pure and perfect white.

Examin'd by the Microſcope, its planes all appear perfect and diſtinct; and where the angle that divides them is nearly obliterated, and ſome of the number appear wanting to the unaſſiſted eyes, the Microſcope ever diſcovers them, and ſhews this to be as certain and determinate a Genus of Cryſtal as the hexangular, tho' not ſo common.

It is found in Sileſia and Bohemia, in the mountains, and on the ſhores of rivers, and is eſteem'd a very valuable Cryſtal.

2. *Pangonium fuſco flaveſcens, pyramide brevi.*
Yellowiſh brown Pangonium, with a ſhort pyramid.

This is a very beautiful and very valuable Cryſtal; it is of a perfectly fine, pure and clear texture, and very ſeldom ſubject to the leaſt flaw or blemiſh, what it it has are uſually very ſmall flakes of a whiter ſubſtance, but theſe are very rare in it; it is like the former, a perfect, regular and determinately figured body, always made up of twenty four planes, and in form of a long and ſlender column, terminated by a ſhort and obtuſe pyramid; it is uſually found of about an inch in length, and ſeldom much exceeds, or falls ſhort of that ſize; its planes are, twelve of them on the pyramid, and the other twelve propagated from theſe, and making up the ſides of the column; they are very irregular in breadth, but have this ſhew of congruity with the common hexangular Cryſtals, that as they have very frequently four planes broader than the other two, both on the pyramid and column, theſe which conſiſt of double their number of ſides, have the ſame proportion; eight of the pyramidal, and eight of the columnar planes being in this ſpecies almoſt conſtantly broader than the others; theſe always join one another at the baſe of the pyramid, the planes on it which are moſt broad, being ever propagated down their dependant planes of the column, and making thoſe of a duly proportionate breadth; the pyramidal planes are very different in length as well as breadth, but that with leſs regularity, two only being uſually very much longer than the reſt, the greater number being extreamly ſhort; the ſurfaces of theſe are perfectly ſmooth, and thoſe of the columnar planes very ſenſibly tho' not deeply ridg'd, the ſtriæ or lines being diſpos'd exactly acroſs the planes, and at conſiderable diſtances from one another; it is uſually found in cluſters of three or four columns together, but not touching, or, however, not injuring one anothers figure; it is of a very agreeable browniſh yellow, and extreamly bright and tranſparent.

It is moderately heavy, and extreamly hard.

It very freely gives fire with ſteel.

It will not ferment with Aqua Fortis.

It calcines very difficultly to a pure white.

Examin'd by the Microſcope, the diſtant ridges, or tranſverſe ſtriæ of the columnar planes, are ſeen to be the larger, but not the only edges of plates that may be there diſtinguiſh'd; the ſmooth ſpaces, as they appear to the naked eye to be between them, being made up of a vaſt number of other finer ſtriæ.

It is found among the ſpecies of Cryſtal before deſcrib'd, under the jewellers name of Saxon topaz, and is uſually brought over among that.

3. *Pangonium lucidum, decolor, pyramide breviſſimo.*
Clear, colourleſs Pangonium, with a very ſhort pyramid.

This is an abſolutely pure Cryſtal, in the ſame multangular form with the others of this Genus; it is of an extreamly clear, pure and fine texture, and never, ſo far as I have yet ſeen, ſubject to the leaſt ſpot or other blemiſh; it is as regularly form'd as the other two, and always found in figure of a ſomewhat ſhort column, terminated by an extreamly ſhort and flat pyramid; it is found from one to two inches in length, and not larger, ſo far as I can yet find; it is regularly and conſtantly compos'd of twenty four unequal planes, twelve on the column, and the ſame number on the pyramid; theſe are very different in breadth, but ſeem ſo in no determinate order, ſometimes four, ſometimes ſix, and ſometimes eight of the twelve on the pyramidal part, being broader than the reſt, and always having the ſame number broader alſo on the column; the ſurfaces of the pyramidal planes are perfectly ſmooth in this as in the other ſpecies, but the columnar ones are extreamly deep ridg'd, the ſtriæ few in number, but all very prominent, and their courſe and order eaſily determin'd by the touch, by drawing the nail of ones finger over them; the root is very remarkably ſhort, a whitiſh and opake ſpot of not more than one twelfth of an inch thick, being all that can be call'd ſo; it ſeems to be commonly found ſingle, and is of a perfect tranſparence, and entirely colourleſs, and of a fine bright water.

It is very heavy, and remarkably hard.

It freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It ſlowly calcines to a pure white.

Examin'd by a Microſcope, each of the ridges on the columnar planes appears not the edge of a ſingle plate, or cruſt, but of a great number terminating together.

It is found in the Eaſt-Indies, but we cannot be certain in what place; all that we know of it is, that it is ſometimes found among the Onyxes, Agates, &c. that make up the India ballaſt.

SERIES III.

Class III. Order III. Genus V.

ARTHRODIA.

CRYSTALS, with ſingle pyramids: dodecahaedral, with very ſhort and ſlender columns, and moderately long pyramids; generally found either cluſter'd together on the ſurface of cryſtalline, or ſtony nodules, of a roundiſh figure; or encruſting the cavities within ſuch or other ſtony nodules; and,

Call'd by Dr. Woodward echinated and concave cryſtalline balls.

1. *Arthrodium perlucidum, decolor.*
Colourleſs, very bright Arthrodium.

This is as pure, as elegant and as regularly figur'd a Cryſtal as any of the whole claſs, tho' its general ſmallneſs makes it but little regarded. It is of a perfectly pure and extreamly fine texture, and very regular and determinate in its figure, being ever an extreamly ſhort hexangular column, terminated by a moderately long and very regular and beautiful hexangular pyramid; it is of different ſizes, but uſually very ſmall, the tenth or eighth part of an inch being its moſt cuſtomary length, tho' we have of it to half an inch or more, in ſome parts of the kingdom; the pyramidal planes appear uſually very nearly all of a breadth, but if carefully examin'd, will be frequently found to be four, a little broader than the other two; they are all very exactly of a length however, and by that means, the figure is made very regular, the apex or ſummit of the pyramid ſtanding over the centre of the column: but tho' this is uſually, it is not, however, always the caſe, but greater or leſſer variations will appear in the different ſpecimens of the ſame cluſters; the columnar planes are uſually exactly proportion'd according to the breadth of the pyramidal ones they are propagated from, and are of a very ſlightly ridg'd ſtructure, the ridges or ſtriæ running all directly acroſs the plane, the pyramidal are ever perfectly ſmooth and even; it is perfectly clear and colourleſs, of a very high natural poliſh, ſcarce at all inferior to the fineſt the lapadaries art could give it, and of a fine and lively dark water.

It is extreamly hard.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very difficultly to a pure white.

Examin'd by the Microſcope, it appears an extreamly elegant body, and its ridges are evidently ſeen to be the edges of only ſingle cruſts, or plates.

It is found in all parts of the kingdom in very different forms, but always in conſiderable quantities together; ſometimes a cluſter of them are found every way ſurrounding a ſingle, or double round ball; and at other times, cracks, cavities, and the natural fiſſures of flints, pebbles, and other ſtones, are found regularly encruſted with it; its greateſt plenty, however, is found coating the round central cavities of the flints of the chalk-pits of Kent, Surrey, and Suſſex.

2. *Arthrodium breve, albidum, hebes.*
Dull, whitiſh Arthrodium.

This is a ſpecies much reſembling the other in figure, but that its pyramids are much ſhorter, and more obtuſe, and its columns uſually ſo ſhort, as not to be eaſily diſcernable. It is of a moderately fine texture naturally, but is in the different ſpecimens found ſo differently debas'd by an admixture of earth, as in ſome to be almoſt entirely opake, and very coarſe. It is ever of the ſame determinate form, always very ſhort, and regularly hexangular on the pyramid, and hexangular on the column. It is found of various ſizes; its uſual ſtandard being at about one tenth of an inch, but ſometimes riſing to near an inch in length; tho' even in theſe longeſt ſpecimens, it is ever proportionate to its more uſual appearance in the thickneſs. The pyramidal planes are very nearly all of a ſize, but if there be any difference between them, it is that two of them, as alſo the two columnar ones propagated from theſe, are ſomething broader than the reſt. Notwithſtanding that thoſe of the pyramid are all ſhort, they are, however, ſome much more ſo than others, and the apex of the pyramid is by that means made not to ſtand exactly in a line with the centre of the column; the pyramidal planes are ever perfectly ſmooth, tho' not ſo bright or gloſſy as thoſe of ſome other ſpecies; thoſe of the columns are very ſlightly ridg'd, and frequently to the naked eye, appear perfectly ſmooth. The root in this is ſeldom at all diſcernable; it is naturally and when pureſt, of a ſomewhat dull and whitiſh caſt, but is frequently found, (beſide the being made more or leſs coarſe and opake, by too large admixtures of earth) ſtain'd to all the colours of the Gems, and that ſometimes by mineral, ſometimes by mere earthy particles; its uſual colours hence, are a faint red, or a duſky yellow, but I have at one time or other ſeen it with more or leſs of the tinge of every one of the Gems; an accident tho' ſo common to this, yet very rarely found affecting the former ſpecies; it is but of a moderate luſtre when pure, and generally is rendered more opake and dull by theſe admixtures.

It is but moderately hard.

It gives fire pretty freely with ſteel.

It will not ferment with Aqua Fortis.

It calcines more freely than the purer Cryſtals.

Examin'd by the Microſcope, the ridges made by the edges of the plates are always diſcover'd even in thoſe of the columnar ſurfaces, which to the naked eye ſeem entirely free from them; it ſeems indeed the conſtant and unalterable courſe of nature in the formation of theſe bodies, and in the numbers of Cryſtals I have examin'd, the many thouſands as I may very truly ſay, I never yet found one in which a good Microſcope could not diſcover them; and few in which they were not obvious to the unaſſiſted eye.

This is found in various parts, both of this and other kingdoms; it is always ſeen in conſiderable cluſters, and its natural form in the aggregate is, either that of the echinated or concave cryſtalline ball; it is beſides theſe, however, found in the form of cruſts, on the ſurfaces of the narrow perpendicular fiſſures of ſtone in the mines of Cornwall, on Mendip-Hills, and in many other parts of the kingdom.

3. *Arthrodium nigricans, pyramide breviore.*
Blackiſh Arthrodium, with very ſhort pyramids.

This is a ſpecies of Cryſtal which deſerves a particular attention, as I have ſome reaſon to believe it both the hardeſt and the brighteſt of all the Claſs; it is of a perfectly pure and fine texture, and generally free from all ſpots or blemiſhes; it is very determinate and regular in its form, being of a ſomewhat longer column, and a ſhorter pyramid than the reſt of this Genus; it is uſually found very ſmall, tho' ſometimes of a ſize that might be conveniently wrought into uſes; nothing is more common than to find it ſo extreamly minute, that its glittering only diſcovers that there is ſome cryſtalline matter in the place, tho' its figure cannot be ſeen but by the help of a Microſcope; the tenth or twelfth of an inch is another very common ſize with it, but it ſometimes arrives to a quarter of an inch, or a third of an inch in length; it is compos'd of twelve planes, ſix on the pyramid pretty equal one to another both in length and breadth, and as many on the column very nearly equal alſo, as regularly anſwering them; four of the pyramidal planes may ſometimes, however, be diſcover'd to be ſomething broader than the other two; and I believe it always indeed to be ſo in ſome degree, tho' the ſmallneſs of the difference makes it leſs obſervable; nothing can be conceiv'd more ſmooth and polite than the ſurfaces both of the pyramidal and columnar planes of this ſpecies appear to the naked eye to be; the pyramidal indeed are truly ſo under the ſtricteſt examination; but the Microſcope diſcovers the columnar to be like thoſe of all the other ſpecies, ridg'd in tranſverſe lines; it is ever found in great quantities together, and is of a fine deep black, and of an extreamly bright water, but when held up againſt the light, appears only of a ſtrong brown, and beautifully tranſparent.

It is very heavy, and extreamly hard.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It very difficultly calcines to a pure white.

Examin'd by the Microſcope, it appears even in its moſt minute ſpecimens the ſame regular body, the column being ever ſlender, and the pyramid ſhorter than in either of the other ſpecies, which is indeed its principal character, ſince Cryſtals of other ſpecies may be tinged to the ſame colour; its columnar planes are very ſlightly ridg'd, and the ridges ſeem the edges of only ſingle, and thoſe extreamly minute and thin plates.

It is very ſcarce when of any conſiderable ſize, but when ſmall is not uncommon in many parts of this kingdom; I have ſeen it in great plenty in the Forreſt of Dean in Glouceſterſhire, in the neighbourhood of Briſtol, and among the rocks at Mount Sorrel. It uſually coats over the ſides of round cavities in ferrugineous ſtones, and is ſometimes found in the form of echinated cryſtalline balls, a great number of ſprigs of it covering all over a round nodule of ſome other ſubſtance; but theſe are ſcarce and ſmall, its moſt common place is in the narrow fiſſures of rocks.

4. *Arthrodium pyramide, obtuſa, lata, columna breviſſima.*
Arthrodium, with a broad, blunt pyramid, and very ſhort column.

This is a ſpecies not leſs ſingular than the reſt, and in the aggregate uſually of very great beauty; it is of a moderately pure and clear texture, but ſubject to frequent ſpots, foulneſſes, and flakes of an opake white, which often diſcover themſelves to a careful obſerver even in the ſmalleſt ſpecimens; it is ever of a determinate form, a very broad and obtuſe pyramid affix'd to a broad and ſhort column; the column in many caſes is ſo very ſhort, as to appear wanting to the naked eye, tho' in all the ſpecimens I have had an opportunity of examining, it ever diſcover'd itſelf to the Microſcope; it is often like the reſt of this Genus extreamly minute, its uſual ſize, however, is a twelfth of an inch in length, and nearly the ſame in diameter at the baſe of the pyramid: it ſometimes is found conſiderably larger, but that very rarely; it is compos'd of twelve very irregular planes, thoſe on the pyramid are uſually four of them conſiderably broader than the other two, tho' theſe not all equally broad, two of them being ever ſomewhat broader than the others; but they are all nearly tho' not exactly of the ſame length. The apex or ſummit of the pyramid is obtuſe, and does not ſtand exactly in the center; the baſe of the pyramid is remarkably broad, and the column to which it is affix'd, is extreamly ſhort, and uſually not diſtinguiſhable to the naked eye, not only by reaſon of its ſhortneſs, but by the poſition of the Cryſtals, which always ſtand ſo cloſe together, that the baſes of their pyramids every way touch one another. They are of various ſizes in the ſame maſs, ſmall ones ſtanding very frequently in the interſtices between the larger, and theſe often injuring one anothers figure.

The pyramidal planes, the only ones which are uſually ſeen, are of a very ſmooth and equal ſurface, and moderately bright and gloſſy; it is always found in large quantities together, and is uſually ſlightly ting'd with red, ſometimes with yellow, but often is only of a dead whitiſh hue.

It is moderately bright and tranſparent, and conſiderably hard and heavy.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines more readily than many others to a pure white.

Examin'd by the Microſcope, its ſhort column always appears, and is always ſeen to be regularly correſpondent to the pyramid. Its planes, tho' extreamly ſhort, yet all commonly anſwer in breadth to the pyramidal ones they were propagated from, and are all plainly ſtriated tranſverſely, tho' frequently with only one or two ſtriæ, ſeldom with more than three or four. In examining ſome of theſe, I have found alſo that the external cruſt was abſolutely whole, and form'd of one ſingle coat, but its tranſparence has made the edges of ſome that were under it, and had form'd ſome of the former planes viſible in two or three plain ſtriæ.

It is found in Cornwall, Yorkſhire, and ſome other counties, but no where ſo frequently as in Glouceſterſhire; it ſometimes makes the cruſt of cavities, or fiſſures in ſtone, but its more frequent appearance is in that of the echinated cryſtalline nodule; which is a roundiſh nodule, ſometimes of an impure Cryſtal, ſometimes of a ſtony matter, and ſometimes of iron ore, cover'd all round, and on every ſide by pyramids of this Cryſtal, joining ſo cloſely at their baſes, as to leave the columns inviſible; and indeed theſe are often found confuſedly mix'd together in breaking the maſs; and ſometimes from the hurry of their concretion, appear irregular, tho' in moſt ſpecimens fair and diſtinct enough, when view'd with proper aſſiſtances. Theſe balls are of various ſizes, from that of a pea, to that of a large wallnut; about the bigneſs of a ſchool boy's marble, is however their more uſual ſize; they are alſo ſometimes found ſingle, and ſometimes two or more join'd together; they are ſometimes whitiſh, ſometimes yellowiſh, but their more uſual colour is a fleſh colour, or ſomewhat deeper red.

5. *Arthrodium, pyramide anguſtiore & longiore.*
Arthrodium, with a very long and narrow pyramid.

This is of all the ſpecies of this Genus, the moſt indeterminate and uncertain in regard to its purity, tranſparence and colour, but never at all varies from its natural figure; even where the moſt ſtrongly impregnated with the metalline colours. It is frequently ſubject to flaky, white or opake flaws, and to other foulneſſes, and is ſometimes of the fineſt water, and at others very dull and dead. It is ever in figure a ſhort hexangular column, terminated by a very long and narrow pyramid, and is of various ſizes, but uſually larger than the others of this claſs; a quarter of an inch is a very common length with it, nor is it uncommon to meet with it of half an inch or more than that. It is compos'd of twelve irregular planes, thoſe on the pyramid are four broader than the other two, and are ever of an unequal length, tho' not greatly ſo; they are but narrow in proportion to their length, and run up to a fine and ſharp point at the top; the column is ſhort, as in all theſe ſpecies, and is compos'd of ſix irregular planes; four of them, as of the pyramidal ones, being ſomewhat broader than the reſt, and theſe uſually affix'd to the broader planes of the pyramid, tho' not exactly anſwering them in breadth; ſome of them ſwelling into a greater, and others being cruſh'd by the adjoining planes, into a narrower compaſs than the baſe of the pyramidal planes they were propagated from. The ſurfaces of the pyramidal planes are very ſmooth and even, and uſually very bright; thoſe of the columnar are very faintly ridg'd or ſtriated acroſs, but are always ſeen to be ſo in ſome degree, when held in a proper point of view.

It is always found in conſiderable numbers together, and is often very beautifully ting'd with the colour of the Topaz or Hyacynth, but more frequently of the Amethyſt.

It is very heavy, and conſiderably hard.

It freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines but ſlowly, but whatever are its colours, it always loſes them in the fire, and comes out of a pure white.

Examin'd by the Microſcope, its columnar planes appear but very ſlightly ſtriated, but the ſtriæ are thus ſeen to be much more numerous than they appeared to the naked eye; they all ſeem made by the edges of only ſingle plates, and thoſe extreamly thin.

It is found in vaſt abundance in Germany: the Hartz foreſt abounds with it, and ſtones containing it are as common in the mines of Goſſelaer in Saxony, as the Septariæ in our common clay pits; we have it alſo in ſufficient plenty in many parts of England; it ſometimes encruſts the perpendicular fiſſures of ſtone, but its uſual appearance is in the cavities of ferrugineous, and ſometimes of ſparry nodules, which are found in vaſt abundance in ſome places, particularly near King's-Weſton in Glouceſterſhire; whence Dr. Woodward, and all the Naturaliſts ſince his Time, have been ſupply'd with them. They lie at different depths, but ſometimes are found near the ſurface, and are of all diameters, from two to twelve or fourteen inches; the Cryſtals within bearing alſo ſome proportion to the ſize of their covering, and being commonly largeſt in the largeſt nodules.

The Cryſtals in theſe are of various colours, but principally yellow or purple; ſometimes they are colour'd throughout, and very frequently the pyramids only have the tinge, the column being left perfectly colourleſs.

APPENDIX to CLASS III.

CRYSTALS influenc'd in their Figure by admixture of metalline particles.

Order the firſt.

MOLYBDIA.

Cubic, owing their figure to lead.

1. *Molybdion cubicum, pellucidum, decolor, cruſtis tenuiſſimis. Bright, colourleſs Molybdion, with extreamly thin cruſts.*

This is a very ſingular and elegant body, of an extreamly pure, clear, and fine texture, and ſeldom found with flaws or blemiſhes of any kind in it; it is of a very determinate figure, being ever a perfect cube, or regular ſolid body, conſiſting of ſix ſquare and equal planes, plac'd at right angles one with another; the ſurfaces of its ſeveral planes are all of the ſame ſtructure, all very bright and gloſſy, and are ſometimes perfectly even and regular throughout, and at others full of inequalities, which ſhew their ſtructure, being made by the deficiency of one or more of the numerous thin plates or cruſts of which this body is compos'd, like the other Cryſtals; theſe are in this ſpecies, when view'd ſingly, extreamly thin, but they are generally laid ſo evenly and cloſely on one another, as, their commiſſures not being diſtinguiſh'd, to paſs for ſingle, when compos'd of a great number. The ſtructure of the body accurately examin'd, will ſhew it to have been compos'd of matter apply'd to the firſt form'd Cubic concretion; for ſuch the lead contain'd in the Cryſtal at its formation, as unalterably determin'd this to be, as the purer Cryſtals, hexangular; this matter ſeems not to have been in theſe as in the columnar and other Cryſtals, however, apply'd to any one determinate point, but on which ever of the planes it fell, to have been dilated and extended by the ambient fluid over it, and to have fallen perpendicularly at the extremity of the ſurface of the Cube, and made a part of the next ſurface, having been extended over it as far as its quantity and degree of concretion would permit; and whenever its extenſion ended, there to have form'd by its edge a ridge like that of the edges of the cruſts on the columnar planes of the more common Cryſtals: the matter next added on this now uneven plane, either barely met, or according to its quality, or degree of concretion extended over the ridge made by it, the extention of it either way making the ſurface plane and ſmooth, and thence running over the next adjoining planes, making them if imperfectly cover'd, irregular as this was before, or if perfectly, than evenly coated.

A cloſe examination of many ſpecimens of this kind or the other Cubic ones, for they are all form'd alike, will convince the obſerver, that this has been the operation of nature in the ſtructure of theſe ſpecies; and all their various appearances from their irregularly broken cruſts, appear clearly explain'd by and reconcilable to it. This is of a very remarkable brightneſs, perfect tranſparence, and fine water; it is of various ſizes, from one tenth of an inch to three fourths of an inch in diameter. The larger ſpecimens are uſually found ſingle, the ſmaller cluſter'd into variouſly ſiz'd maſſes.

It is extreamly heavy, but leſs hard than the common Cryſtals.

It but difficultly will be made to give fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very ſlowly but to a pure white.

Examin'd by the Microſcope, its ſtructure is more clearly underſtood than by the naked eye, and the commiſſures of the complex cruſts diſtinguiſh'd; when ſingle, they are very remarkably thin, and ſcarce exceed the flakes of the fineſt foliaceous Talcs: the ridges on the ſurfaces of this body are ſometimes of theſe ſingle ones, and are then not at all diſcernable by the naked eye, but the Microſcope ſhews a multitude of them where the ſurface appears without it, perfectly ſmooth.

It is found in different parts of this and other kingdoms, but always about lead mines; it is more frequently found in the Yorkſhire mines than in any other, but is no where very common: Notwithſtanding that it is naturally colourleſs, it is frequently found ting'd with the colours of all the Gems; red, green, and yellow, are often finely diffus'd thro' it, and were it not for its ſoftneſs, it would in theſe caſes very much come up to the nature of the Gems.

2. *Molybdion hebes, albidum vel coloratum, cruſtis craſſioribus.*
Dull, whitiſh, or colour'd Molybdion, with thicker cruſts.

This is a ſpecies much approaching to the former in ſhape and ſtructure, but extreamly different in purity, and in the thickneſs of its conſtituent cruſts; it is of a ſomewhat coarſe and foul texture, and very ſubject to the flaws and blemiſhes common in the ordinary Cryſtal, particularly to the white opake flakes, of which it is ſometimes ſo full as to appear as if crack'd and flaw'd all over by a violent blow. It is as regularly conſtructed and perfect in its figure as the former, and like it is ever in form of a regular Cube; it is of various ſizes, from a quarter of an inch to near two inches in diameter, and is compos'd like the others of its kind, of a multitude of flakes or cruſts expanded, ſome entirely, others imperfectly over the ſeveral ſurfaces: it is much more ſubject, however, to have broken plates, or parts only of plates on its ſurfaces than the former, and they are always of a much greater thickneſs. It is ſometimes found ſingle, but more frequently in maſſes compos'd of forty or more of the ſmaller Cubes irregularly thrown together, tho' ſometimes cohering very firmly one to another, and often running into, and injuring one another's ſhape; it is but of a coarſe and dull appearance, but is tolerably tranſparent; it is naturally of a ſomewhat whitiſh hue, but is as often found colour'd as in its natural ſtate; and according to the metalline particles of another kind which it has taken up in its formation, is ſometimes green, ſometimes blue, and ſometimes purple; but much more frequently than all, of a pale yellow: theſe tinges it has from extreamly ſmall portions of the metalline particles they are owing to, but it contains ſo large a ſhare of lead, that it is made by it extreamly heavy, and much ſofter than pure Cryſtal.

It but difficultly gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

Whatever is its colour, it always calcines to a pure white.

Examin'd by the Microſcope, its ſtructure is ſeen very diſtinctly; and the ſeveral plates, the edges of which make the inequalities of its ſurfaces, are all ſingle, tho' much thicker than the complex plates of the former kind, which are ſometimes made of a very great number join'd together.

It is found in and about lead mines as the former, and generally adhering to the ſides of perpendicular fiſſures in the ſolid ſtrata.

3. *Molybdion hebes, cruſtis craſſiſſimis, albido-ſubcæruleum.*
Dull, blueiſh white Molybdion, with very thick cruſts.

This is a very ſingular and very elegant ſpecies of Cryſtal, but from its coarſe look and manner of concretion in large maſſes, has, for want of Criterions for judging of and diſtinguiſhing foſſile bodies, been hitherto generally eſteem'd a Spar.

It is of a very coarſe, foul and impure texture, and ſubject to all the imperfections and blemiſhes of Cryſtal; it is when ſingle, ever of a perfect and regular figure, a true and equal cube, but is very ſeldom found ſingle or ſeparate from other bodies, or compleat. When it is ſo it is compos'd of ſix regular ſides, and each of thoſe of a vaſt number of parallel plates, or cruſts, which ſcarce ever ſingly and perfectly cover any one of the ſurfaces, but uſually appear in many parts of it in irregular but conſiderably thick ridges; it uſually, however, ſhews only two or three of its ſurfaces, for it is commonly found in very large complex maſſes of two foot or more in diameter, made up of an irregular concretion of a vaſt quantity of the Cryſtal, in form of a thick coat over ſome other body, and that covered with large cubic concretions; which, however, as they are uſually either blended with, or immers'd in the maſs in part of their ſurfaces, ſhew only three ſides of the Cube in each. Theſe are always to be diſtinguiſh'd from the parts of other figures by their all ſtanding at right angles one with another; the Cubes found ſingle are of various ſizes, from one ſixth of one inch, to an inch and half in diameter; thoſe found together, and affix'd on the cryſtalline maſſes before deſcrib'd, are alſo of very different ſizes, even in the ſame maſs, and plac'd in different directions, but the largeſt of theſe ſeldom exceed three quarters of an inch in diameter.

They are of very uneven ſurfaces, if ſtrictly examin'd; the plates which compoſe each plane being variouſly broken and imperfect, and terminating in irregularly angular edges; it is of a very dull, obſcure and duſky look, and of but a ſmall ſhare of tranſparence.

It is extreamly heavy, and moderately hard.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines ſlowly to a pure white.

Examin'd by the Microſcope, its conſtituent plates, which to the naked eye appear the thickeſt and coarſeſt of thoſe of all the Cryſtals of this ſort, are found to be themſelves compos'd of even millions of infinitely fine and thin ones, laid very evenly and beautifully on one another; but like the thicker or compound plates, ſeen on the ſurfaces of the planes, they are moſt of them broken or imperfect, and terminated in different parts of the plane in irregular edges.

It is found in almoſt all parts of England where there are lead mines, encruſting in flat large maſſes of two or three inches thick, the ſides of caverns, and of the perpendicular fiſſures of the ſtrata. In Derbyſhire, where it is very common in theſe complex maſſes, it has uſually one conſtant appearance; it is found adhering to various ſtones, which are in many places coated over, and vein'd with Mundics, or Marcaſites of various kinds, and it has uſually either under or among its maſs a ſmall vein of lead ore; its irregular baſis is pretty clear, and of a blueiſh white, but its Cubes are generally full of ſmall ſpangles of the ſame Marcaſite that coats its Matrix, and are often cover'd in different parts with beautiful concretions, of the ſame body, and with ſmall flaky pieces of a fine gloſſy lead ore. In Cornwall it is more frequently met with ſingle, and is in that ſtate alſo ſometimes in the irregular maſſes, ſubject to be ſtain'd with the various colours of the Gems, but moſt frequently with yellow.

CRYSTALS influenced in their figure by metalline particles. Order the ſecond.

CASSITERIA.

PYRAMIDAL, *with four planes; owing their figure to tins.*

1. *Caſſiterion albidum, pellucidum.*
Whitiſh, pellucid Caſſiterion.

This is a tolerably bright and pellucid Cryſtal, and of as determinate and regular a figure as thoſe influenc'd by the former metal, but its form in ſome degree reſembling the natural figure of the points of ſome Cryſtals when the number of planes are not examin'd, it has by ſome been miſtaken for a natural figure of Cryſtal; ſuch, however, as have ſeen the ſalt of tin carefully prepar'd, and find it exactly of this figure, will not wonder at that metals being concerned in giving the ſame figure to the Cryſtals, into whoſe compoſition it enters, as indeed from all Cryſtals of this figure tin may be ſeparated by aſſaying.

This is of a moderately fine, clear and pure texture, and ſeldom ſubject to the common blemiſhes of Cryſtal; when it has any, they are uſually either in opake flakes, which give the Rainbow colours in reflection, or in a number of ſhort and ſlender black ſtreaks, reſembling ſhort pieces of hair, and uſually miſtaken for ſuch in Cryſtals. It is of a perfect and regular form, being ever found in figure of a quadrilateral pyramid, very ſhort, and conſiderably broad at the bottom, and there affix'd to a ſolid body without any column; It is of various ſizes, its moſt frequent is about half an inch in height, and a little leſs than that in diameter at the baſe; but is found ſometimes to two inches high, and of a proportionate breadth; and ſometimes in vaſt cluſters encruſting the fiſſures of ſtone the largeſt ſingle Cryſtal not exceeding the ſize of a grain of barley; it appears, on a ſlight view, of a very ſmooth even ſurface in all parts; but more nearly examin'd, is found to be compos'd of a number of ſomewhat thick plates or flakes, very ſeldom ſingly covering any one of the planes, but uſually terminated on the different flakes in different parts in very rugged and unequal edges; theſe are evidently of the ſame nature with the ſtreaks or ridges on the columnar planes of common Cryſtals, but that they are not ſo even or regular, and none of them are ever propagated from, or into another of the planes, or ſides of the pyramid; their edges are alſo principally ſeen toward the bottoms of the planes or baſe of the pyramid, and from a careful examination of them in theſe and the other particulars, which they have in common with the conſtituent flakes or cruſts of the other Cryſtals, it will eaſily be ſeen that they are of a like nature; and that the formation of this has been analogous to that of the other ſpecies; its firſt concretion having been in form of what we ſee its larger ones, a quadrilateral pyramid with a broad baſe; the additional matter for the encreaſe of this body has been apply'd in ſmall quantities at a time, and thoſe to the upper part of ſome one of the planes; and thence been dilated and extended by the ambient fluid into a thin plate, over either the whole ſurface of that plane, or a part only of it according to its quantity and degree of concretion; for, if either a very ſmall quantity of the matter have been depoſited at once, or that in ſo advanced a ſtate of concretion as to be almoſt already harden'd, and therefore not capable of being dilated or expanded by the ambient fluid, it could only make a part of an encruſting flake, or plate; and if in larger quantity, or in a moiſter ſtate, and not ſo near its final concretion, it has been expanded over the whole ſurface, and became a perfect plate covering the whole. From the irregular and uncertain manner of the application of this new matter to one or other of the planes, they, as thoſe of the pyramids of the common Cryſtals, are frequently found one larger and broader than another, tho' not in any certain proportion; but the additional matter added to one plane, only extends and enlarges that, never running into, or on the adjoining planes; and that ſo encreas'd, eſpecially if by ſeveral additions one ſucceeding another, muſt be larger than the reſt till they are in the ſame manner encreas'd and made equal to it.

It is ſometimes found ſingle, tho' never detach'd or looſe, but always adhering to ſome other foſſile body at its baſe, and ſometimes is ſeen in large quantities together, covering and encruſting the ſurfaces of the fiſſures of the ſolid-ſtrata; the ſingle ſpecimens are always the larger: they are all of a whitiſh caſt, and tolerably bright and pellucid; and are extreamly heavy, and hard.

It freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines ſlowly to a pure white.

Examin'd by the Microſcope, the cruſts of which the planes are compos'd, appear all very plainly to have been expanded and driven from the upper part of the pyramid toward its baſe, and all to be compos'd of a number of other extreamly thin and fine ones.

It is found principally in Devonſhire and Cornwall, and is not very common in the larger ſpecimens, the ſmaller in cruſts are frequent.

2. *Caſſiterion fuſcum.*
Brown Caſſiterion.

This is like the former, a very regularly form'd and perfect body; it is of a ſomewhat coarſe, impure and duſky texture; but is very little ſubject to any of the blemiſhes of Cryſtal; it is ever found in the form of a ſhort and low pyramid, very broad at the baſe, and affix'd there without the intervention of any column to ſome other body; it is of various ſizes, but uſually of about one third of an inch in diameter at the baſe, and of a little more than that meaſure in height; it is compos'd of four ſides or planes, ſeldom perfectly equal in breadth, yet with no determinate or regular inequality, ſometimes one, ſometimes two, and ſometimes three, being broader than the other one, two, or three, but this with no certainty; it appearing evidently that the only natural and certain determination of the body, is into a broad quadrilateral pyramid, and that the irregularity of its ſides in breadth is merely accidental, from the more or leſs plentiful application of freſh matter to them at their original formation.

It is naturally of a very ſmooth and gloſſy ſurface, and in ſome ſpecimens where the planes are ſmooth and equal, appears all over ſo, in others leſs ſo, the ſeveral planes being all compos'd of a number of cruſts or flakes, and having theſe in ſome covering ſingly the whole plane, and ſo giving a perfectly even and uninterruptedly ſmooth ſurface; while in others, as in the other Cryſtals, theſe flakes terminating in form of ridges in various parts of the plane, make it very irregular and uneven, and by that means leſs uniformly gloſſy; the ſeveral cruſts or flakes compoſing this ſpecies are extreamly thin, and conſequently the ridges very ſlight, often indeed they are not diſtinguiſhable unleſs in a proper point of view, and then appear as irregular lines, but ſcarce diſtinguiſhably more prominent than the reſt of the ſurface; this is the caſe where they lie ſingle, but in ſuch as have them conjunct, and laid four or five together to the forming one more diſtinguiſhable, they make the ſurfaces very evidently unequal; theſe ridges are ever principally obſervable near the baſe of the pyramid, or broader part of the planes; and it is eaſy to ſee by their order and direction, that the additional matter for the formation and encreaſe of theſe pyramids, has been all added near the tops of the ſeveral planes, and thence dilated and driven down by the ambient fluid toward their baſes.

It is ſometimes found ſingle, but more often in irregular cluſters; it never is looſe, or detach'd, but always adheres to ſome other body at its baſe; and in the cluſters often the ſeveral ſpecimens adhere to, or run into one another; it is ever of a ſomewhat deep and duſky brown, of a very bright and gloſſy ſurface, and but very moderately tranſparent at beſt, and often abſolutely opake.

It is remarkably heavy, and very hard.

It freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines to a dull duſky grey, or aſh-colour.

Examin'd by the Microſcope, it appears compos'd ſometimes of the thinner, and ſometimes of the compoſit or thicker flakes, which are plainly ſeen to be made of four or more of the former; but even theſe thinner ones carefully examin'd, are found not to be ſingle plates, but each compos'd of a multitude of extreamly fine and thin flakes like thoſe of the finer foliaceous Talcs.

It is found in great plenty in Devonſhire and Cornwall, and is well known there to contain a great quantity of tin; it is ſubject, as is the former, to various metalline tinges, but principally to a faint obſcure red, but even this is not common.

CRYSTALS influenced in their figure by metalline particles.

Order the third.

SIDERIA.

RHomboidal, compos'd of ſix planes; owing their figure to iron.

1. *Siderion pellucidum, decolor, tenuius.*
Colourleſs, pellucid, thin Siderion.

This is a very elegant and beautiful body; it is of a perfectly pure, fine and clear texture, uſually free from all ſpots or blemiſhes, and of a perfect and determinate figure, being ever found in a Rhomboidal form, conſiderably broad in proportion to its length, and of various ſizes, but never very large; vaſt numbers of the ſpecimens are not beyond the ſize of a grain of wheat, and the larger ſeldom exceed a third of an inch in length; they are always compos'd of ſix planes, and are in this ſpecies but thin in proportion to their ſize; the common meaſure of one of the larger ſpecimens, being in length one third of an inch, in breadth ſomething leſs than a quarter of an inch, and in thickneſs not more than one fifth or one ſixth of an inch; the ſurfaces of its two larger planes, which may naturally enough be call'd its top and bottom, are always conſiderably ſmooth and polite, and thoſe of the others are very often not leſs ſo, tho' ſometimes they are made up near all their edges of plain and regular horizontal lines; the moſt ſeemingly ſmooth and even planes, however, when nicely examin'd, appear to be mark'd a-croſs with ſome irregular lines, which an eye, accuſtom'd to the examination of the Cryſtals, will eaſily diſtinguiſh to be the extremities of the conſtituent plates of thoſe bodies; and on a cloſe examination, the ſtructure of the whole and apparent difference of the lateral planes in different ſpecimens appear to be this.

The firſt concretion of Cryſtal influenced by iron, being, as that of all other Cryſtal is, in the determinate figure, that the body when compleat is to be of; the matter apply'd from time to time for the encreaſe of the body, has been added only to one or other of the two broad planes, and according to its different quantity and degree of concretion,

cretion, has been differently expanded over the ſurface it was apply'd to, by the ambient fluid, if from its ſmall quantity or other accidents it did not ſpread ſo far as to cover the whole of that ſurface; it form'd a partial plate, the extremities or edges of which have made the ridges or irregular lines viſible on the ſurface of that plane; but theſe applications having been made ever in ſmall quantities, the plates compos'd of them are all extreamly thin, and conſequently the ridges form'd by their extremities or edges, ſo little prominent above the other or lower ſurface as not to be eaſily diſtinguiſhable; and hence the apparent ſmoothneſs of the planes ſo common in this ſpecies; there ſeems, however, in new matter thus added and extended, both in this and other like caſes, a natural propenſity in the after added quantities, tho' more in quantity, or more expanſible in their texture, if not greatly ſo in one or other particular, to ſtop at the edge of the already form'd plate, and not ſpread beyond it; whether this be from ſome contraction, or curling up of the extream edge of every plate, making by that means a rim or ridge to it juſt at the verge, ſomewhat higher than the reſt of the ſurface, and by that means capable of ſtopping the progreſs of the next expanding matter for a plate, and ſo preventing it unleſs ſo much greater in quantity as to over-run this boundary, from ſpreading beyond it; whether it be from this (as tho' I think I have ſeen this ſtructure in the extream edge of ſome plates, yet in bodies ſo minute, it is not eaſy to determine any thing with certainty,) or from ſome other more latent cauſe, yet it frequently happens, that the extenſion of the matter of many ſucceeding plates in this as well as in the other Cryſtals, frequently ends at the ſame line, and makes a more prominent ridge, and conſiderable inequality in the ſurface in different planes; frequently alſo, as is indeed much more natural to expect, all the expanded matter ſtops at the edge of the body in the outer cruſts, and gives a plainly ſtriated appearance round the extremities; but much oftner having reach'd the edges, it falls over and covers part, or the whole ſurface of the adjoining planes, as the matter added to their encreaſing ſize, ſometimes alſo, tho' rarely ſwells into the planes of theſe.

From this view of the ſtructure of this body, all the irregularities of its ſurfaces will be eaſily accounted for, and the whole operation of nature in its compoſition found analagous to that ſhe has uſed in the formation of the other Cryſtals; and from this proceſs in its ſtructure, it cannot but be that we muſt ſee, as we frequently do, ſometimes its whole planes perfectly ſmooth, as cover'd by, and their whole ſurface made of one ſingle cruſt; ſometimes the ſame planes ridg'd with very thin edges of ſingle plates, or thicker, of conjunct ones, and ſometimes emulating a ſtriated appearance near their extremities.

This ſpecies is ſometimes found ſingle, looſe and independent, ſometimes in complex cluſters, the various cryſtallizations running into one another, and mutilating and injuring their forms; but moſt frequently it is found apply'd by one of its planes to the ſides of ſmall cavities in various iron ores, encruſting them as the more common Cryſtals do the like cavities in flints; it is ever, when pure, of a fine tranſparence, colourleſs as water, and of a great degree of brightneſs, but it is ſubject to the various tinges of the Gems, and is found blue, green, red, &c. but this very rarely.

It is extreamly heavy, and very hard.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very ſlowly to a pale fleſh colour, never to the pure white of the common Cryſtals.

Examin'd by the Microſcope, its plates appear naturally very thin and fine, tho' leſs ſo than thoſe of either the lead or tin Cryſtals; but what appear as ſingle cruſts to the naked eye, are as plainly thus ſeen to be compos'd of other finer ones, as the compoſit or thicker cruſts of them.

I have found it in conſiderable quantities among the iron ores of the foreſt of Dean in Glouceſterſhire; it has not been my fortune to meet with it in any other of our iron mines, tho' I doubt not but it is in one part or other of them all throughout the kingdom.

2. *Siderion craſſius, fuſcum, hebes.*
Dull, and thick, brown Siderion.

This is of a ſomewhat foul, obſcure, and duſky look, but is not ſubject, or, however, very rarely ſo, to the ordinary blemiſhes of Cryſtal; it is a very perfect, regular, and determinately figur'd body, being ever found in a fair Rhomboidal form, but moderately broad in proportion to its length, and always of very conſiderable thickneſs; it is like the other Cryſtals, various in ſize, but is moſt frequently found ſmall; its moſt uſual ſtandard is about a quarter of an inch in length, not more than an eighth of an inch in breadth, and about a ſixth of an inch in thickneſs; it is frequently found much ſmaller than this, and ſometimes conſiderably larger, but uſually keeps very regularly to this proportion in its meaſures; it is compos'd of ſix planes, all appearing at firſt view of tolerably ſmooth ſurfaces in the generality of the ſpecimens, tho' in ſome they are conſiderably unequal, but when attentively view'd in a proper light, the eveneſt of them will be found to be full of minute ridges, like thoſe of the columns of the ordinary Cryſtal, and made like them of the edges of the ſeveral plates that compoſe their body, tho' ſeldom ſo ſtrait or even as in thoſe columns, being more frequently, variouſly, and irregularly notch'd, and as it were broken off; the plates of which this ſpecies is compos'd, are uſually laid ſingly, and are very thin, and thence the ridges of their extremities are ſo little prominent above the reſt of the ſurface, as not to be eaſily diſtinguiſhable unleſs view'd in a proper light; and to this is owing the apparent ſmoothneſs of the ſurfaces of all the planes; ſometimes, however, it happens, that ſeveral of theſe thin and fine plates are regularly laid together and form one thick one; and this, where it happens in one, is uſually the caſe in all the plates of the ſame ſpecimen, whence the irregularity of the ſurfaces of all the planes in ſome ſpecimens of this body; this, however, can be properly accounted no other than a mere Luſus Naturæ in the body, ſince there are ſome ſpecimens where the plates are partly complex, partly ſingle.

It is ſometimes found in ſingle ſpecimens, and thoſe looſe and detach'd from all other bodies, but more frequently appears in cluſters among the maſſes of iron Stalactitæ, common in the iron mines of Glouceſterſhire, and call'd, Bruſh Iron Ore. It is naturally of a pale but duſky brown, conſiderably opake, and of a dull and dead appearance; but it is ſubject like all other Cryſtals to metalline tinges, and is not unfrequently found of a pale obſcure amethyſt colour, or of a duſky yellow.

It is conſiderably heavy, and moderately hard.

It gives fire very freely with ſteel.

It will not all ferment with Aqua Fortis.

It calcines to a coarſe brick colour, or ſtrong diſagreeable red.

Examin'd by the Microſcope, its complex plates appear compos'd of numbers of the more ſimple ones, and theſe laid but irregularly together in compariſon with the regularity of the ſtructure of the other Cryſtals; but even the more ſimple ones, ſtrictly examin'd at their edges, appear to be compos'd of many others laid together, not much more regularly than they in the more plainly complex plates.

It is frequent in the mines of the foreſt of Dean, and probably in other places; it adheres to all kinds of iron ores, and often in great abundance.

3. *Siderion pellucidum, nigricans.*
Black, gloſſy Siderion.

This is perhaps as elegant and beautiful a body as any of the Cryſtal claſs; It is of an extreamly pure, clear and fine texture, and very ſeldom affected by the ordinary defects of Cryſtal; it is a very beautifully perfect and regular body, being ever found in a fair Rhomboidal form, of thickneſs and breadth neither extraordinary, but both very regularly proportion'd to its length; it is of various ſizes, but its moſt frequent ſtandard is about a third of an inch in length; it is ſometimes, tho' rarely, found larger, and very frequently extreamly ſmall; whatever be its ſize, it keeps regularly to this proportion, and never appears either ſo remarkably broad and thin as the white, or ſo thick as the brown Rhomboidal Cryſtals; it is compos'd of ſix ſides or planes, all appearing very bright, ſmooth and gloſſy, and not diſtinguiſhably ridg'd, unleſs by the help of a Microſcope, or of a very well adapted light. Nicely examin'd it is, however, diſcover'd to be compos'd of a number of plates or flaky cruſts like the other Cryſtals, and thoſe to be all extreamly thin, and all of the ſame determinate thinneſs; they are ſo regularly extended over the broader planes of the body, that it is not unfrequent to find thoſe compos'd of Series of whole plates, and for that reaſon perfectly ſmooth and free from the leaſt appearance of ridges; the lateral planes are always ridg'd in irregular lines form'd of the irregularly terminated plates they are compos'd of; which frequently ſeem wholly compos'd of the abundant matter of the broader planes falling on and differently extended over them; theſe alſo ever appear of the ſame extream thinneſs, and all to be the edges of ſingle plates.

It is uſually found ſingle in the larger ſpecimens, and in large quantities together when ſmaller; it is of a fine blackiſh colour, very bright, and conſiderably tranſparent, and of a remarkable luſtre, and fine water.

It is remarkably heavy, and very hard.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines very ſlowly, and to an opake but fine purpliſh red.

Examin'd by the Microſcope, it appears compos'd of very thin flakes or cruſts, and theſe truly ſingle, the moſt powerful glaſſes not being able to ſhew any thing of their being compos'd of ſmaller.

It is frequent, when ſmall, on the ſurfaces of the perpendicular fiſſures in the iron mines of Glouceſterſhire; and is ſometimes, tho' more rarely, found in the ſame places looſe, and in large ſpecimens.

4. *Siderion hebes, craſſiſſimum, ruber.*
Very thick, dull, red Siderion.

This is a ſpecies perfectly different from all the former, and is often found in larger ſpecimens; it is of an extreamly coarſe and foul texture, and very ſubject to opake ſpots of a deep red, as alſo to the flakes and clouds ſo frequent in the more common Cryſtals; it is of a very regular, perfect and determinate figure, being always found in form of a long and very thick Rhomboid; it is of various ſizes, ſometimes very ſmall, and at others of near an inch in length, but its moſt conſtant ſtandard ſeems about half an inch; it is ever remarkably long in proportion to its breadth, and of a thickneſs uſually very nearly equal to its length; it is compos'd of ſix planes, the ſurfaces of which are uſually very full of irregular ridges, made of the edges of their conſtituent plates, which are of very various thickneſſes; ſome of them appearing of ſingle cruſts, but the greater number compos'd of an aſſemblage of theſe in various numbers, two, three, four, or many more; the broader ſurfaces, if any can in this ſpecies be properly call'd ſo, are no more free from theſe inequalities than the reſt, ſo remarkably different is it in its ſtructure from the laſt deſcrib'd ſpecies.

It is ſometimes found ſingle and looſe in the larger ſpecimens, but more frequently in great numbers of ſmaller encruſting ferrugineous bodies; it is ever very obſcure, opake and dull, and always of a faint but ſomewhat purpliſh red; the other ſpecies are ſubject to be thus ting'd, but they are only in ſome caſes ſo, and are not affected in their brightneſs or tranſparence by it; they are alſo ſubject to be ſtain'd with other colours; but this is always ſo, and is never of any other colour, nor ever more tranſparent than in its uſual ſtate.

It is extreamly heavy, and remarkably hard.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It calcines ſlowly to a deep purple.

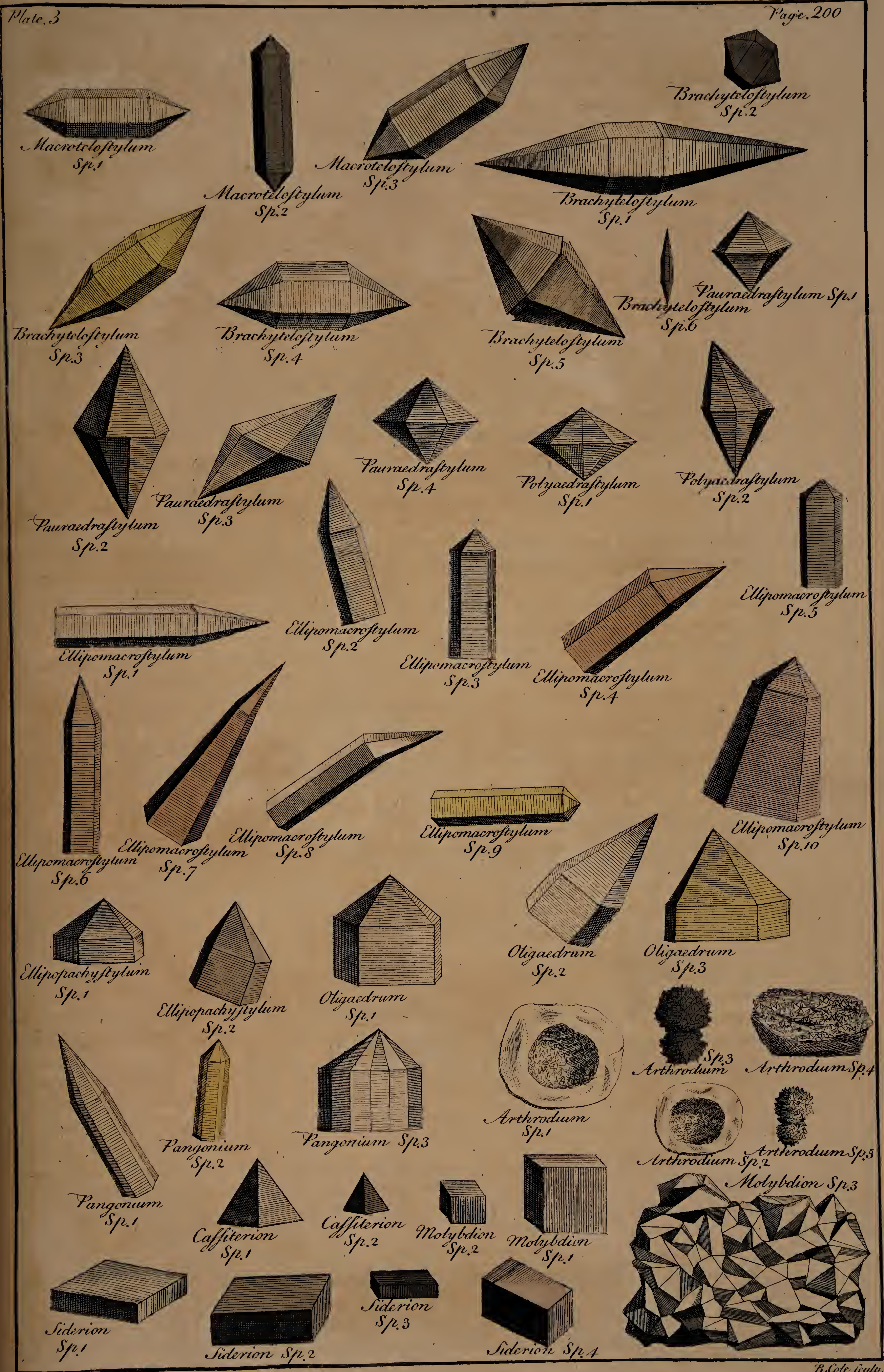
Examin'd by the Microſcope, it appears compos'd like the reſt, of a vaſt number of plates, but the thinneſt of theſe are conſiderably coarſe and thick, tho' evidently ſingle; theſe are frequently join'd in different numbers, and make the plates diſtinguiſhably even by the naked eye of different thickneſſes.

It is found in the iron mines in the foreſt of Dean, and is the only one I have found of this kind elſewhere; tho' I doubt not but that the reſt are produced in our other mines, by whatever accidents it happened that I have not met with them: this I have many times ſeen in Suſſex, and once near Mount Sorrel in Leiceſterſhire among the rocks above the Town.

CRYSTALS.

Plate. 3

Page. 200



B. Cole ſculp.

FOSSILS

NATURALLY and eſſentially ſimple, not inflammable nor ſoluble in water, of a regular ſtructure, and determinate figure.

Series the third.

Claſs the third.

SPARS.

Foſſils when pure, pellucid and colourleſs, of regularly angular figures, and emulating the appearance of Cryſtal, but wanting its diſtinguiſhing characters; all compos'd of plane and equable plates, not flexile or elaſtic, not giving fire with ſteel, very freely and readily calcining in the fire, fermenting violently with Aqua Fortis, and wholly diſſolving in it.

Of this Claſs there are ten Orders, and under thoſe twenty one Genera.

Order the firſt.

Spars perfect, pellucid and Cryſtalliform, columnar, and terminated by double pyramids one at each end.

Order the ſecond.

Spars, pellucid and Cryſtalliform, compos'd of two pyramids, join'd baſe to baſe, without any intermediate column.

Order the third.

Spars, Cryſtalliform and columnar, terminated at their ſummit by a pyramid, and adhering irregularly to ſome other body at their baſe.

Order the fourth.

Pyramidal Cryſtalliform Spars, without columns, compos'd of ſingle pyramids, affix'd by their baſes to ſome ſolid body.

Order the fifth.

Spars, pellucid and cryſtalline, in form of an oblique parallellopiped, with ſix parallellogram ſides, and eight ſolid angles, eaſily fiſſile either in an horizontal or perpendicular direction; and compos'd of numbers of very thin plates, and thoſe of regularly and elegantly arrang'd bodies, of the ſame form with the whole maſs, except that they are thinner in proportion to their horizontal planes; and naturally breaking into theſe and no other figures on a ſlight blow, as ſeeming ultimately compos'd of theſe concretions.

Order the ſixth.

Spars, pellucid and cryſtalline, externally of no determinate form, but breaking into Rhomboidal maſſes; eaſily fiſſile, and compos'd of plates running both horizontally and perpendicularly thro' the maſs; ſpliting moſt freely in an horizontal direction, and ultimately compos'd of irregular arrangements of ſhort and thick Rhomboidal concretions.

Order the ſeventh.

Cruſtaceous Spars, cryſtallino-terrene, or debas'd from their cryſtalline hue by a large admixture of earth, imperfectly pellucid, and form'd into thin plates with flat ſurfaces,

cover'd

cover'd at times in part, or entirely with botryoide prominences of rough ſurfaces: ſtriated within, compos'd of oblong concretions of no determinately angular figure.

Order the eighth.

Cruſtaceous terrene Spars, ſo highly ſated with earth, as to appear many of them to the naked eye as mere earths, deſtitute of all brightneſs and tranſparence, form'd into thin plates covering the ſurfaces of fiſſures of ſtone, or ſurrounding vegetable or other extraneous bodies; of a looſe irregular ſtructure, and not ſtriated within.

Order the ninth.

Spars, more or leſs pellucid, uſually form'd into oblong and ſomewhat conical bodies, compos'd of ſeveral ſeries of cruſts, and commonly call'd Stalactitæ, or ſtony icicles.

Order the tenth.

Spars, more or leſs pure, form'd into ſmall round figures, compos'd of numerous cruſts of a finely ſtriated texture, call'd Stalagmitæ.

APPENDIX to CLASS III.

Spars, influenc'd in their figures by metalline particles.

Order the firſt.

Cubic, or owing their figure to lead.

Order the ſecond.

Pyramidal, with four planes, owing their figure to tin.

Order the third.

Rhomboidal, and conſiſting of ſix planes, owing their figure to iron.

SPARS.

Order the firſt.

Genus 1. TRIEXAHEDRIA. *Perfect double pointed Spars, octodecahaedral, or compos'd of eighteen planes, in an hexangular column, terminated by two hexangular pyramids.*

Genus 2. TRIPENTAHEDRIA. *Perfect double pointed cryſtalline Spars, pentadecahaedral, or compos'd of fifteen planes in a pentangular column, terminated by two pentangular pyramids.*

Genus 3. ENNEAHAEDRIA. *Perfect, double pointed, cryſtalline Spars, enneahaedral, or compos'd of nine planes in a trigonal column, terminated by two trigonal pyramids.*

SPARS.

Order the ſecond.

Genus 1. DIOCTAHEDRIA. *Cryſtalline Spars, double pointed, hexadecahaedral, or compos'd of two octangular pyramids, join'd baſe to baſe, without any intermediate column.*

Genus 2. DIEXAHEDRIA. *Cryſtalline Spars, double pointed, dodecahaedral, or compos'd of two hexangular pyramids, join'd baſe to baſe.*

Genus 3. DITRIHEDRIA. *Cryſtalline Spars, double pointed, hexaedral, or compos'd of two trigonal pyramids, join'd baſe to baſe.*

SPARS.

Order the third.

Genus 1. HEXAEDROSTYLA. *Cryſtalline Spars, ſingle pointed, dodecahaedral, or compos'd of an hexangular column, terminated by an hexangular pyramid.*

Genus 2. PENTAEDROSTYLA. *Cryſtalline Spars, ſingle pointed, decahaedral, or compos'd of a pentangular column, terminated by a pentangular pyramid.*

Genus 3. TRIEDROSTYLÆ. *Cryſtalline Spars, ſingle pointed, hexaedral, or compos'd of a trigonal column, terminated by a trigonal pyramid.*

SPARS.

Order the fourth.

Genus 1. HEXAPYRAMIDES. *Cryſtalline Spars, without columns, hexaedral, or compos'd of ſingle hexangular pyramids.*

Genus 2. TRIPYRAMIDES. *Cryſtalline Spars, without columns, trigonal, or compos'd of ſingle trigonal columns.*

SPARS.

Order the fifth.

Of this Order, there is only one known Genus.

PARALLELLOPOPEDIA.

Spars regularly parallellopideds in their whole maſſes, as well as in their conſtituent particles.

SPARS.

Order the ſixth.

Of this Order there is alſo only one Genus.

ANOMORHOMBOIDIA.

Spars of irregular figures externally, but compos'd of, and breaking into Rhomboidal pieces.

SPARS.

Order the ſeventh.

Genus 1. PLACAGNODIAUGIA. *Cryſtallino-terrene, cruſtaceous Spars, of irregular ſurfaces, but of a ſtriated texture within; ſemi-pellucid, and ſomewhat bright.*

Genus 2. PLACAGNOSCIERIA. *Cryſtallino-terrene, cruſtaceous Spars, of irregular ſurfaces, not of a ſtriated texture within, dull and opake.*

SPARS.

Order the eighth.

Genus 1. CIBDELOSTRACIA. *Terrene Spars, deſtitute of all brightneſs, or tranſparence, form'd into thin plates, and uſually found covering the ſides of fiſſures and other cavities of ſtone, with congeries of them of great extent, and of plain or botryoide ſurfaces.*

Genus 2. CIBDELOPLACIA. *Terrene Spars, deſtitute of all brightneſs, or tranſparence, form'd into plates, and uſually found coating over vegetable and other extraneous bodies in form of incruſtations.*

SPARS.

Order the ninth.

Genus 1. STALACTAGNIA. *Cryſtalline Spars, form'd into oblong conical bodies, compos'd of various cruſts, and uſually found hanging in form of icicles from the roofs of grottoes, &c.*

Genus 2. STALACTOCIBDELA. *Cryſtallino-terrene, and terrene Spars, form'd into oblong bodies, and found hanging from the roofs of grottoes, &c.*

SPARS.

Order the tenth.

Genus 1. STALAGMODIAUGIA. *Spars, found in form of ſmall round balls, each compos'd of numerous cruſts, pellucid and cryſtalline.*

Genus 2. STALAGMOSCIERIA. *Spars, found in form of ſmall round balls, compos'd of numerous cruſts; opake, cryſtallino-terrene, and terrene.*

APPENDIX to the CLASS.

SPARS, *influenced in their texture by metalline particles.*

Order 1. CUBIDIA. *Cubic, or owing their figure to lead.*

Order 2. TETRAPYRAMIDIA. *Pyramidal, of four planes, owing their figure to tin.*

Order 3. RHOMBOIDIA. *Rhomboidal, conſiſting of ſix planes, influenc'd by iron.*

SERIES III.

CLASS III. ORDER I. GENUS I.

TRIEXAHEDRIA.

P*ERFECT, pellucid and cryſtalliform Spars; columnar, and terminated by double pyramids, one at each end, octodecahaedral, or compos'd of eighteen planes, in an hexangular column, with hexangular points.*

1. *Triexahedrium pyramidibus, anguſtioribus, oblongis.*
Triexahedrium, with a narrow and oblong pyramid.

This is a body ſo exactly reſembling one of the octodecahedral Cryſtals, as ſcarce to be diſtinguiſh'd from it at ſight; it is of a very pure, fine and clear texture, not at all ſubject to films, clouds, or any other blemiſh, and is without all queſtion the moſt pure and perfect of the whole claſs of Spars; it is a perfect and regularly form'd body, an hexangular column, terminated at each end by a long and ſlender hexangular pyramid; the column is of a moderate length, and no great thickneſs, and the pyramids remarkably ſlender, long and pointed; it is moſt frequently found very ſmall, the twelfth of an inch being a common length with it, but it is ſometimes ſeen to half an inch, or three quarters of an inch long; its column taking up about a third part of its length, and being uſually of a little more than half its own length in thickneſs; the pyramidal planes are very nearly regular in length and breadth, two only of them are a little longer and broader than the reſt; the columnar planes regularly anſwer theſe in breadth, and are two broader than the other four, and theſe always the two which are join'd to the baſes of the two broader pyramidal planes, which always ſtand regularly oppoſite to one another in the two pyramids; the ſurfaces of the pyramidal planes are perfectly ſmooth, even and polite as in the Cryſtals, and the columnar are ridg'd in the ſame manner with the columnar planes of Cryſtal directly acroſs, and that for the ſame reaſon; the matter which has been added for the increaſe of the body having ever been added to the pyramidal planes only, as in the Cryſtals, (to which the formation of theſe bodies is perfectly analogous in all reſpects,) and thence dilated and extended by the ambient fluid, and driven down that plane of the column only which is affix'd to that pyramidal plane it was lodg'd on; this is ſucceſſively done to all the planes of the pyramids, and ſucceſſively driven from them over their columnar ones; and the plates form'd by theſe additions of matter, are extended to different lengths over the columns, and their extremities make the ridges ſo very diſtinguiſhable on all the columns of this ſpecies.

It is uſually found ſingle and looſe when in large ſpecimens, but the ſmaller are frequently lodg'd in conſiderable numbers in the coarſer and more lax ſtones of ſtrata; it is the moſt bright and pellucid of all the Spars when pure, and is naturally colourleſs, and perfectly reſembles one of the whitiſh or leſs pure Cryſtals, but it is found ſometimes rendered more white and opake by an admixture of earth, and ſometimes ting'd with the colours of the Gems, but more frequently of a faint purple than any other.

It is conſiderably heavy, but not very hard; it is eaſily ſcratch'd with the point of a knife in any part, but much more eaſily on the pyramidal than on the columnar planes; which ſeems analagous to ſome other bodies, as the Selenitæ are all much more eaſily ſcratch'd on their horizontal ſurfaces, whereas on the pyramidal planes of this body there is only one ſmooth and even plate to cut, than on the Rhombs or Trapezia, in which, as on the columnar planes of this body, there are the edges of many of thoſe plates to cut over: its thinneſt flakes are not at all flexile, or elaſtic.

It will by no means give fire with ſteel.

It ferments violently with Aqua Fortis, and is perfectly diſſolv'd by it, and readily calcines in a moderate fire; ſo extreamly different is this body from Cryſtal, notwithſtanding that it ſo exactly reſembles it in ſhape, origin, and formation, and in its whole external appearance.

Examin'd by the Microſcope, the pyramidal planes appear perfectly ſmooth and polite, the ridges on the columns are generally even and ſtrait, and go directly acroſs; they are conſiderably thick, and are diſcover'd to be made by the extremities of a vaſt number of thin flakes terminated very regularly together.

It is found in the Mountains of Germany, and in ſome parts of the Britiſh dominions, particularly in North Wales; but we have it principally of the ſmaller ſort, and lodg'd in a coarſe gritty ſtone.

2. *Triexahaedrium, pyramidibus breviſſimis, columna longiore.*
Triexahaedrium, with very ſhort pyramids, and a long column.

This is a ſpecies of no leſs beauty than the former; it is of a perfectly pure, clear and fine texture, and ſeldom affected by any ſpots or blemiſhes; it is a very regularly form'd and perfect body, ever in the ſame determinate form, a conſiderably long and moderately thick hexangular column, terminated at each end by a very ſhort hexangular pyramid; it is of various ſizes, but the moſt uſual is about an inch in length, and a third of an inch in diameter; it is ſeldom found larger than this, and very ſeldom of any ſize between this and very ſmall, the tenth or twelfth of an inch being its uſual ſize when lodg'd in other bodies; the pyramidal planes are extreamly ſhort and broad, and the pyramids very low and obtuſe, the ſides are all nearly equal both in length and breadth; the ſurfaces of the pyramidal planes are perfectly ſmooth, and conſiderably bright and gloſſy, thoſe of the columnar are very ſlightly ridg'd, and are not diſcover'd to be ſo at all, unleſs view'd in a proper light, and the ſtreaks then appear tranſverſe and ſtrait, but very thin, and not ſo cloſe as in many other kinds.

It is ſometimes found ſingle, but is rarely ſo; the ſmaller ſpecimens are uſually found lodg'd in great numbers in the ſtrata of the laxer ſtones, and the larger, frequently eight, ten, or more together, croſſing one another at various angles, and firmly cohering together, where they come into contact; it is uſually perfectly clear and colourleſs, but wants the luſtre and fine water of the Cryſtals.

It is conſiderably heavy, but very ſoft, and is eaſily ſcratch'd with a penknife.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis, and is perfectly diſſolv'd by it.

It very freely and readily calcines in the fire.

Examin'd by the Microſcope, its tranſverſe ſtreaks on the columns, tho' ſo extreamly ſlender as ſcarce to be diſtinguiſhable to the naked eye, yet are plainly ſeen to be each the edge of a whole congeries of ſmall and fine flakes, or cruſts, like the ſpangles of the finer foliaceous Talcs.

It is found in the great mine at Goſſelaer in Saxony, and ſometimes in the Hartz foreſt, and is one of the many things the Germans call Spaad; their very miners, notwithſtanding its appearance, diſtinguiſhing it from Cryſtal.

3. *Triexahedrium, pyramidibus brevibus, columna breviſſima.*
Triexahedrium, with ſhort pyramids, and a very ſhort column.

This is a ſingular and very remarkable ſpecies, and ſo extreamly different from the others in the remarkable ſhortneſs both of its column and pyramids, as to need no other character for its diſtinction; it is of a moderately pure and fine texture, but ſomewhat more foul'd with earth than either of the others before deſcrib'd, and ſubject to duſky and very opake clouds and ſpots; it is ever found in the ſame determinate figure, an extreamly ſhort and thick double pointed maſs, with a column ſo very ſhort as not to be diſtinguiſh'd on a ſlight view; it is uſually found of about half an inch in length, and of very little leſs than that in thickneſs, and ſeldom varies much from that ſtandard; it is compos'd of eighteen planes, ſix on the column, and ſix on each of the pyramids; the pyramidal planes appear all very nearly of the ſame breadth and length, but cloſely examin'd, are found to be four ſomewhat longer and broader than the other two on each pyramid; the broad ones on each always ſtand oppoſite to one another, and the columnar planes that join them are alſo broader than the other two, tho' not in any certain or regular proportion, nor exactly of the ſame breadth with the pyramidal planes they are propagated from; the abundant quantity of matter from ſome one of theſe often ſwelling the plane it forms on the pyramid as well as that on the column, to more than its due breadth, either in proportion to each other, or to the planes of the oppoſite pyramid, or the end of the columnar ones that join them; this as the matter of one plane, is never extended over another, cannot but be the caſe when it it is thrown on in too large a quantity and in a ſpreading ſtate; for when it is added, tho' in a large quantity, yet in a degree of concretion which renders it leſs expanſible, it forms irregular protuberances and cavities on the columnar, and ſometimes on the pyramidal planes, tho' that more rarely, and makes the whole a diſtemper'd concretion. The pyramidal planes of this are very ſmooth, but very little gloſſy, or polite; and the columnar tho' very ſhort, ſhew evident traces of the manner of their formation, in deep tho' not numerous irregularities made by the edges of complex plates.

It is ever found looſe and ſeparate from all other bodies, but generally in cluſters of eight, ten, or twelve together, tho' no where cohering, or affix'd to one another; it is but of a duſky hue, and has little tranſparence, it is frequently whitiſh, but oftner of an obſcure, tho' faint browniſh red.

It is conſiderably heavy, and ſomewhat harder than the generality of Spars. It is, however, pretty eaſily ſcratch'd with a knife.

It will not at all give fire with ſteel.

It ferments with Aqua Fortis, diſſolving freely in it, but depoſiting a whitiſh or a reddiſh ſediment.

It very freely calcines to a pure white.

The Microſcope ſhews the ridges of its columnar planes to be made by the extreme edges of compound flakes conſiderably thick, and made up of others which are leſs minute and thin than thoſe of many others.

It is found in the lead mines of Yorkſhire, and in no other part of the kingdom that I have yet heard of.

SERIES III.

CLASS III. ORDER I. GENUS II.

TRIPENTAHAEDRIA.

CRyſtalliform columnar double pointed Spars, pentadecahaedral, or compos'd of a pentangular column, terminated at each end by a pentangular pyramid.

Of this Genus we yet know only one ſpecies.

2. *Tripentahaedrium, pyramidibus breviſſimis, latis.*
Tripentahaedrium, with very ſhort and broad pyramids.

This is a ſingle and very ſingular ſpecies, but is one of the moſt certain and determinate in its figure and conſtitution of all the claſs; it is ever of an extreamly pure, clear, and perfectly fine texture, and ſcarce ever foul'd with the ſlighteſt blemiſhes; it is ever of the ſame exactly determinate form, a moderately long and thick column, terminated at each end by a depreſs'd pyramid, compos'd of broad and ſhort planes, and ending in an obtuſe point; it is of various ſizes, ſpecimens of it being not unfrequently found of an inch in length, and more than half an inch in diameter, tho' its more conſtant and uſual ſize is but about a third or a fourth of this; it is compos'd of fifteen planes, the column and pyramids being all pentangular; the pyramids are compos'd of planes extreamly different from one another in ſize, but always regularly ſo, two of them being ever much longer and broader than the other three. The ſurfaces of all theſe are very even, and conſiderably bright and gloſſy; the broader planes on each pyramid, always regularly ſtand over againſt one another, and are join'd by two columnar ones, like themſelves, much broader, tho' ſhorter than the other three; the ſurfaces of the columnar planes are all ridg'd tranſverſely with very fair and ſomewhat prominent ridges, but thoſe not drawn evenly acroſs as in moſt of the columnar Cryſtals and Spars, but irregularly notch'd, wav'd and uneven.

It is uſually found ſingle, lodg'd in the ſtrata of Clay in the manner of the Selenitæ, three or four ſpecimens are ſometimes found lying together very near one another, but ſcarce ever cohering together; it is naturally colourleſs and pellucid as water, but without the fine luſtre and brightneſs of the Cryſtals.

It is moderately heavy, and conſiderably hard, but yet may be ſcratch'd pretty eaſily on the pyramidal planes by the point of a penknife.

It will not at all give fire with ſteel.

It is perfectly diſſolv'd by Aqua Fortis.

Examin'd by the Microſcope, the ridges on the columnar planes appear the edges of complex flakes, or cruſts, compos'd of different numbers of very thin and fine ones, like the Squammæ of the foliaceous Talcs.

It is found in Derbyſhire, Yorkſhire and Cornwall, but is not common in any of thoſe Counties in Saxony, and particularly about Gloſſelaer it is more frequent.

SERIES III.

CLASS III. ORDER I. GENUS III.

ENNEAHEDRIA.

Cryſtalliform columnar double pointed Spars, enneahedral, or compos'd of a trigonal column terminated at each end by a trigonal pyramid.

The trigonal form ſeems the moſt natural to Spar, as the hexangular to Cryſtal, and there are more ſpecies of theſe Genera both among the double pointed and the ſingle pointed columnar, than of any the other Genera, and thoſe ſpecies in general are more frequent.

1. *Enneahedrium, pyramidibus longioribus, columna longiore.*
Enneahedrium, with long pyramids, and a long column.

This is of a moderately fine and pure texture, but of a whitiſh caſt, and ſomewhat dead and dull look; it is very ſeldom found with flaws or blemiſhes; and is ever of a determinate and regular figure, a trigonal column terminated by a trigonal pyramid at each end; it is generally long and ſlender in the column as well as pyramids, and is found of various ſizes, from three inches in length, to the third part of an inch, or leſs than that, but its uſual ſtandard is about an inch or a very little more; its column takes up nearly half the meaſure, and is uſually in one of this length of about one third of an inch in thickneſs; it is compos'd of nine planes, three on the column, and three on each of the pyramids; the pyramidal planes are not equal in ſize, for one is always longer and broader in each pyramid than the other two; theſe broader planes ever anſwer directly to one another in the oppoſite pyramids, and are join'd by a plane of the column proportionably, or a little more than ſo, broader than the reſt; the ſurfaces of the pyramidal planes are ſomewhat bright as well as ſmooth, and are by much the livelyeſt part of the body, the whole being but dull; the columnar are tolerably even, but appear ſtriated acroſs in an irregular manner, and with very ſmall and commonly very diſtant ſtriæ; it is uſually perfectly colourleſs, except for the miſty caſt of whitiſhneſs it has in common with the Spars, not otherwiſe colour'd, and with the coarſer Cryſtals, but is ſometimes found ting'd with the colours of the Gems, and making a very beautiful figure, appearing like a trigonal bar ſhap'd by art out of a ſtone of that colour.

It is conſiderably heavy, but very ſoft, and eaſily ſcratch'd.

It will not at all give fire with ſteel.

It is diſſolv'd readily by Aqua Fortis.

It calcines in a little time to a pure ſnow white.

It is uſually found ſingle, but ſometimes in irregular cluſters, the ſprigs croſſing one another at different angles, and cohering firmly where they come in contact.

It is found in the mines of Germany often in very great plenty; and ſometimes in thoſe of Cornwall and Devonſhire with us, but uſually is ſingle here, and in but ſmall ſpecimens.

2. *Enneahedrium, pyramidibus longiſſimis, columna brevi.*
Enneahedrium, with very long pyramids, and a ſhort column.

This is but of a coarſe and impure texture, and is frequently ſubject to foulneſſes that render it in many places perfectly opake; the whitiſh and obſcure flaky flaws ſo frequent in the coarſer Cryſtals, are alſo common in this, and it is not rare to find it with black, greeniſh, or reddiſh ſpots; it is, however, of a very determinate and regular figure, a very ſhort and thick column, terminated by a very remarkably long and pointed pyramid at each end; it is uſually very ſmall, but is ſometimes found of a quarter of an inch, and ſometimes, tho' rarely, of more than half an inch in diameter; in a ſpecimen of half an inch, its column is hardly of the breadth of a ſtraw in length, and its thickneſs uſually about a third part of its length; it is compos'd of nine planes, three on each of the pyramids, and three on the column; they are all very nearly equal in breadth, but two of the pyramidal ones at each end are always ſomewhat longer than the other, and theſe exactly anſwering one another, the two columnar planes that join them are by ſo much ſhorter than the other plane; the pyramidal planes are ſmooth as in the other ſpecies: but the columnar, tho' ſo very ſhort, are plainly ridg'd with frequent tranſverſe lines.

It is naturally of a pale duſky browniſh hue, with ſome faint admixture of a bluſh of red among it, and is at beſt but very faintly tranſparent; it is at times found ting'd with other colours, and then is generally more opake.

It is conſiderably heavy, but very ſoft, and eaſily ſcratch'd with a knife.

It will not at all give fire with ſteel.

It ferments readily with Aqua Fortis, and diſſolves in it, leaving a ſmall browniſh ſediment.

It freely and eaſily calcines to a pale fleſh colour.

Examin'd by the Microſcope, it appears of an irregular texture, and variouſly clouded and ſpotted with earthy matter; its pyramidal planes have no lines or furrows, but thoſe on the columnar are plainly the edges of complex plates.

It is found in the iron mines in the foreſt of Dean, ſometimes ſingle, and at others in cluſters together, but never adhering either to one another, or regularly to any other body.

3. *Enneahedrium gricile, pyramidibus breviſſimis.*
Slender Enneahedrium, with very ſhort pyramids.

This a is ſpecies extreamly different from all the others, and ſubject to varieties from adventitious admixtures, which make it differ extreamly in the different ſpecimens even from itſelf; it is naturally of a tolerably pure, fine and equal texture, and often perfectly free from blemiſhes of all kinds, tho' too ſubject at times to them all, and often ſo loaded with earthy or mineral particles, as to be wholly obſcure, dull, and opake; it is a very regularly form'd and perfect body, ever a long and ſlender column terminated by an obtuſe end compos'd of three planes, and making a blunt trigonal pyramid; the column being alſo trigonal, makes the whole body a figure of nine planes; it is of various ſizes, from a quarter of an inch to three inches in length, but is moſt frequently found of about three quarters of an inch, and when of that length, is not more than one ſixth of an inch in thickneſs; the pyramidal planes are ſmooth and even, and very nearly regular in ſhape, one only being a little longer and broader than the reſt; the columnar planes are regularly propagated from theſe, and the ſingle broader plane in each pyramid exactly ſtanding over againſt its fellow in the other; that columnar ſide which joins them, and is propagated from them, is a little ſhorter, and conſiderably broader than the reſt, it uſually ſwelling beyond the proportion of the larger plane of the pyramid to the reſt; the columnar planes are all ſtriated acroſs with very fine and cloſe lines, but particularly the broad one, in which the ſtructure of theſe columnar bodies is as beautifully ſeen as in almoſt any other Spar that I have ſeen; its colour, tranſparence, and degree of brightneſs are not eaſily determined, the various admixtures it is ſubject to, making almoſt endleſs varieties in theſe. In general, both theſe perfect or double pointed Cryſtals and Spars, are purer than the columnar that are found affix'd to other bodies, but this is the coarſeſt of all the Spars of this order; it is when pureſt, of a ſomewhat blueiſh white, with a great cloudyneſs diffus'd thro' its whole ſubſtance; but it is ſometimes found very opake, yet conſiderably bright and gloſſy, and of a pale fleſh colour; ſometimes it is of a very duſky greyiſh blue, approaching to a lead colour, and at others of a yellowiſh or ferrugineous brown; in theſe different colours it is differently opake, but in all preſerves very conſtantly its figure.

It is conſiderably heavy, but very ſoft and eaſily ſcratch'd.

It will not at all give fire with ſteel.

It ferments violently with Aqua Fortis, and very freely diſſolves in it, leaving only a ſlight whitiſh, browniſh, or blueiſh ſediment, according to its different colour.

It very freely calcines to a duſky greyiſh, or a reddiſh white.

Examin'd by the Microſcope, it appears of a foul texture, its pyramidal planes are often made rough by being irregularly cover'd with a yellowiſh ferrugineous matter which adheres firmly to them, but they are in themſelves always perfectly ſmooth and even; the columnar ſurfaces are all evenly ſtriated, and all, eſpecially the broad one, ſhew their ſtructure in each of the ridges, which is evidently made up of a number of thin flakes or cruſts, propagated from the adjoining pyramidal planes at each end; the cruſts running the contrary ways from the two ends and meeting irregularly at, or near the center; this different order and diſtribution of the cruſts, may be diſcovered even by the touch, if the finger nail be lightly drawn over the ſurface.

It is found in England and Germany, but no where ſo plentifully as in Ireland; it is ſometimes found ſingle, but more frequently in cluſters, conſiſting of fifty or an hundred ſpecimens join'd longitudinally, and cohering ſide to ſide very firmly.

4. *Enneahedrium, pyramidibus, ut & columna, brevibus & latis.*

Enneahedrium, with ſhort flat pyramids and column.

This is of a conſiderably coarſe, foul, and impure texture, not being ſubject to the common blemiſhes of theſe tranſparent bodies, but to ſuffuſions of a browniſh earthy matter thro' its whole maſs, the Spar concreting with the earth among it, and holding it in equal proportion in every incruſtation; it is of a very regular figure, a ſhort column, but conſiderably thick, and very remarkably broad or flatiſh, and terminated at each end by a pyramid of the ſame ſhape; it is of various ſizes, from an inch to the twentieth part of an inch in length, and generally nearly equals its length in the breadth of its larger plane; it is compos'd of nine planes, the three on each pyramid are tolerably ſmooth and polite, but one on each is ever of at leaſt twice the breadth of the reſt, and is ſomething tho' not at all proportionably longer; theſe broad planes on the two pyramids regularly anſwer one another, and are join'd by a columnar plane of more than equal breadth, propagated from the baſes of both, and compos'd of large and thick flakes, whoſe extremities ſhew themſelves in ſo many very viſible and very ſtrait and even tranſverſe ridges; this columnar plane is vaſtly broader than the others, and with the broad pyramidal ones it joins, gives the whole body a remarkably flat look.

It is uſually of a coarſe texture, and pale brown colour, and has but a moderate degree of tranſparence, and yet leſs of the luſtre of Cryſtal; it is ſubject to various tinges from metalline particles, but makes no great figure with them, being ever opake and coarſe.

It is moderately heavy, and very ſoft, and eaſily ſcratch'd.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis, and diſſolves in it, leaving a ſmall earthy remainder, the caſe of all the Spars that have taken up earth at the time of their concretions.

Examin'd by the Microſcope, it appears plainly obſcur'd by a foreign opake matter, and is found compos'd of thicker cruſts than any other kind, the ridges on the broad columnar plane being very prominent, and compos'd each of three, four, or more conſiderably thick coats.

It is always found ſingle and looſe, no two having ever been found cohering together, or any ſingle ſpecimen of it affix'd to any other body.

It is very frequent in the mines at Goſſelaer, and ſometimes is ſeen in England: with us it is generally immers'd in the ſtrata of the laxer ſtones.

SERIES III.

CLASS III. ORDER II. GENUS I.

DIOCTAHEDRIA.

PELLUCID and Cryſtalliform Spars, compos'd of two pyramids, join'd baſe to baſe, without any intermediate column; hexadecahaedral, or compos'd of two octangular pyramids.

1. *Dioctahedrium, pyramidibus longioribus.* *Dioctahedrium, with long pyramids.*

This is an extreamly elegant and beautiful body, it is of a very pure, clear and fine texture, and is ſcarce ever found blemiſh'd with ſpots or clouds; it is an extreamly determinate and regular ſpecies in its figure, being ever compos'd of two octangular pyramids join'd cloſely baſe to baſe, with not the leaſt appearance of any thing of a column between; it is long and ſlender for a body of this kind, being uſually found of about three quarters of an inch in length, and of not more than one third of its length in diameter; it is rarely found larger than this, and ſeldom much ſmaller, and is almoſt the only ſpecies not found in ſome places in extream ſmall concretions; it is compos'd of ſixteen planes, each of its pyramids being octangular: the planes are all extreamly ſmooth and polite, and are remarkably long in proportion to their breadth; they are all alſo either exactly or very nearly of the ſame length, but two in each pyramid are always conſiderably narrower than the reſt.

It is almoſt perfectly colourleſs, the only tinge it has being a very inconſiderable one of a whitiſh hue; it is very tranſparent, and remarkably bright for a Spar, and is ſometimes ſubject to the metalline tinges, having been found blue and yellow.

It is conſiderably heavy, and moderately hard; it may, however, be cut with a file, but will not at all give fire.

It ferments very violently with Aqua Fortis, and is entirely diſſolv'd by it leaving no viſible ſediment.

It very readily calcines to a pure white.

Examin'd by the Microſcope, it appears of a very pure texture, and ſhews not the leaſt appearance or trace of the manner of its ſtructure, unleſs it be any where a little irregular at the commiſſure of the two pyramids, or accidentally broken near that place; if the edge of one pyramid hangs over the correſpondent plane of the oppoſite one in any part, ſometimes the edge may be ſeen to be beautifully plated; tho' this is not certain, for one or more of the laſt cruſts having fallen over the edge, often give that as ſmooth a coat as the reſt, but if the ſpecimen be broken any where near the baſes of the pyramids, the texture is then evidently diſcover'd, and the body plainly ſeen to be compos'd of a vaſt number of parallel plates extreamly thin and fine, and propagated from the ſummit of each pyramid to its baſe, ſeparately in each plane; for the order of the plates does not exactly agree in any two planes, nor is any one plate ever found to cover the leaſt part of any other plane than that it is propagated along; and notwithſtanding that this is ſo beautifully diſtinct in the bottom of each pyramid, yet near the ſummit no ſuch ſtructure is to be diſcover'd, the plates being all too firmly and exactly join'd there to ſhew their commiſſures: and the ſame is the caſe in the inner part of even the baſes, it being only a ſmall thickneſs of the external cruſts, where the commiſſures remain diſtinct and viſible, the firſt added quantities of matter have every where join'd ſo as to make one uniform maſs; the loweſt part or fartheſt extent of the laſt added matter, which perhaps was too far concreted to ſpread ſo perfectly, or evenly, or intermix itſelf ſo well with the quickly hardened matter of the laſt plate, only ſhewing theſe marks of its formation.

It is found in the mines of Rammelſburg, in the Hartz foreſt in Germany, and not elſewhere ſo far as is yet known.

2. *Dioctahedrium, pyramidibus brevioribus acuminatis.* *Dioctahedrium, with ſhort and ſharp pointed pyramids.*

This is of a very pure, fine and clear ſtructure, and inferior to none of the Spars in beauty; it is ever of the ſame determinate form, which is that of two very ſhort octangular pyramids, with remarkably ſharp points, and extreamly broad baſes in proportion to their height, join'd evenly and regularly baſe to baſe without any intermediate column; the body itſelf is extreamly ſhort in proportion to its thickneſs; it is not unfrequently found of half an inch thick, but never of more than two thirds of its thickneſs in length; it is in the whole compos'd of ſixteen planes, all very nearly of the ſame length, but four on each pyramid ever conſiderably broader than the other four; and theſe are ſometimes in the two pyramids placed evenly againſt one another, ſometimes otherwiſe; the ſurfaces of all theſe, that is to ſay of the whole body, is extreamly ſmooth and even, and for a Spar very gloſſy; it is of a fine clearneſs, naturally colourleſs, and with leſs of the miſty whitiſh caſt than almoſt any other Spar.

It is conſiderably heavy, but very ſoft, and is eaſily ſcratch'd with a knife.

It will not give fire with ſteel.

It very freely and violently ferments with Aqua Fortis, and is entirely diſſolv'd by it.

It calcines very readily into a pure white.

Examin'd by the Microſcope, it appears of a truly cryſtalline tranſparence, but without the luſtre, or fine water of thoſe bodies. Unleſs it is injur'd by accidents, it ſeldom ſhews any traces of its ſtructure, but if flaw'd or broken near the baſes of the pyramids, it ſhews them to be compos'd of extreamly minute plates.

It is found in ſeveral of the mines of the Hartz foreſt, and is ſometimes ting'd with metalline particles.

3. *Dioctahedrium hebes, pyramidibus brevibus, obtuſis.* *Dioctahedrium, with ſhort, obtuſe pyramids.*

This is a much coarſer kind than either of the former, but is very ſingular, and not without its beauty. It is of a ſomewhat foul, impure and rude texture, and ſometimes ſubject to great numbers of flakes and cloudy blemiſhes, and ſometimes obſcur'd by a ſuffuſion of earthy matter, either white, reddiſh, or pale brown all thro' its ſubſtance. It is in form a double pyramid, but that of a very ſingular kind; the two octangular pyramids which join'd baſe to baſe compoſe it, are very broad at their baſes, and very ſhort and extreamly blunt at their points; it is neceſſarily therefore extreamly ſhort in proportion to its thickneſs, being uſually three times at leaſt as thick as long. It is found of various ſizes, from that of a ſmall pea, to half an inch in diameter, tho' it ſeldom exceeds that. Its planes are all very broad and ſhort, but three of them in each pyramid are ſo much broader and longer than the reſt, that being plac'd regularly over againſt one another, as I think they conſtantly are in this ſpecies, the ſummit of the pyramid never ſtands on either ſide in the centre of the body. The whole being compos'd of pyramidal planes, has no tranſverſe ſtriæ to be diſtinguiſh'd on any part of it; (the plates that compoſe theſe bodies always compleatly ſpreading over them,) and is therefore of a perfectly ſmooth and even ſurface, unleſs when very much loaded with earth; in which caſe the ſurfaces are ſome of them frequently cavernous and irregular, but even then they do not diſcover any ſtriæ, or appearance of plates to the naked eye. It is either of a dead whitiſh hue, which is its moſt uſual, and indeed its natural colour, or of a pale reddiſh or faint brown; and has very little brightneſs, and ſeldom much tranſparence.

It is conſiderably heavy, but not hard; and is eaſily ſcratch'd with a knife.

It will not give fire with ſteel.

It ferments very violently with Aqua Fortis, and is perfectly diſſolv'd by it.

It readily calcines to a pure white, or pale fleſh colour.

Examin'd by the Microſcope its adulterating earth may be diſcover'd to be perfectly mix'd in the greater part of it, and is indeed equally diffus'd thro' every the ſmalleſt plate it is compos'd of; its texture is not to be diſcern'd, unleſs it has been accidentally crack'd near the commiſſure of the pyramids, or the edge of any of the plates of one over-hang the baſe of the oppoſite plane; it is then diſtinguiſh'd to be compos'd of plates leſs thin and numerous than thoſe of the finer kinds.

It is found in the mines of Cornwal, but very rarely; and there have been inſtances of ſmall ſpecimens of it lodg'd in the Ketton ſtone of Rutland.

SERIES III.

CLASS III. ORDER II. GENUS II.

DIEXAHEDRIA.

PELLUCID and cryſtalliform Spars, compos'd of two pyramids join'd baſe to baſe without an intermediate column, dodecahaedral, or compos'd of two hexangular pyramids.

1. *Diexahedrium, pyramidibus longioribus, auguſtis, acuminatis.*
Diexahedrium, with long, narrow, ſharp pointed pyramids.

This is naturally of a very fine, clear and pure texture, but is ſometimes foul'd with flaky clouds, and oftner with ſmall ſemi-opake ſpecks of a white earthy matter; theſe are lodg'd in various parts of the maſs, but principally near one or the other end, never very near the baſes of the pyramids where they join one another. It is of a very perfect, regular and determinate form, ever being compos'd of two long, ſlender and ſharp pointed pyramids; the length is therefore always conſiderable in proportion to the thickneſs; it is frequently found of near an inch long, and ſeldom ſo much as a third of an inch in diameter at the baſes of the pyramids; the planes of each pyramid are ever conſtantly four broader and ſomewhat longer than the other two; and theſe broader planes joining in the two pyramids, make the point or ſummit of each not exactly in the center of the body. The ſurfaces of all theſe planes are perfectly ſmooth and polite; it is naturally colourleſs except for a faint caſt of whitiſhneſs, which few of the Spars not ſtain'd with other colours are without, and is very tranſparent, and of a greater degree of brightneſs than is uſual with the Spars.

It is very weighty, and very ſoft, and is eaſily ſcratch'd.

It will not give fire with ſteel.

It ferments with, and is almoſt entirely diſſolv'd by Aqua Fortis.

It very freely calcines to a pure white.

Examin'd by the Microſcope, it appears very pure and pellucid; and its ſpots are ſeen to be extreamly thin Lamina of earth, either blended with, or evenly laid between the matter of ſome of the inner cruſts.

It is found in the mines on Mendip Hills. In Lambs Hill cave, a vaſt ſubterranean cavern there, I found two or three ſpecimens lying on the floor, and more in the walls of the cavern, in the ſtrata of a lax ſtone.

2. *Diexahedrium, pyramidibus longioribus, & latis, obtuſis.*
Diexahedrium, with long, broad, and obtuſe pyramids.

This is ſometimes of a tolerably pure and clear texture, but more frequently is duſky and coarſe, from an admixture of earth of various colours, which is ſometimes found lodg'd in it, in form of ſpots and flaws, and ſometimes diffus'd thro' its whole ſubſtance in an equal cloud. It is compos'd of two long pyramids, with very broad baſes, and running into but an obtuſe point; theſe join'd baſe to baſe, make the whole body conſiderably thick in proportion to its length; tho' the pyramids are each ſeparately conſiderably long. It is found of various ſizes, from the length of a barley corn to that of an inch and half, and is uſually of a little more than half its length in thickneſs. The ſix planes on each pyramid are ſo very equal both in length and breadth, that it is not eaſy to ſay any are larger than the reſt; the ſurfaces are all tolerably even and ſmooth, but ſeldom have any great brightneſs. It is either whitiſh, yellowiſh, reddiſh, or grey, according to the nature of the earth it has concreted among, and taken up at that time; it is in the different ſpecimens differently tranſparent, and ſometimes ſcarce at all ſo.

It is moderately heavy, and very ſoft.

It is eaſily ſcratch'd, and will not give fire with ſteel.

It ferments with, and is diſſolv'd by Aqua Fortis, leaving only a ſmall ſediment.

It pretty freely calcines to a greyiſh or reddiſh white.

Examin'd by the Microſcope, it appears very coarſe and foul, even in the ſpecimens which ſeem moſt pure to the naked eye; and if the baſes do not exactly meet, or any other accident gives an opportunity of ſeeing its ſtructure, it is found compos'd of very coarſe and thick plates.

It is found in the great mine at Goſſelaer in Saxony, and in many of the mines of the Hartz foreſt.

It may ſeem particular, that none of the collectors of Foſſils, or writers on them, ſeem to have been acquainted with theſe Cryſtalliform double pointed Spars, ſeeing they are all, and probably yet more ſpecies, and even Genera of them, to be found in the German and other mines; but the truth of the whole is this, That theſe bodies being many of them tolerably pellucid, and in the form of perfect Cryſtals, while there were yet no Criterions fix'd for determining with any ſort of certainty what Foſſil bodies truly were, as I think before myſelf in this very caſe, no body has given characters by which Spars could be diſtinguiſh'd from Cryſtals, theſe Spars from their cryſtalline form and appearance all have paſs'd for real Cryſtals. And I think I can trace in the figures of Aldrovandus, De Boet, Mercatus and the reſt, among thoſe of the double pointed Cryſtals, the lineaments of many of my new Spars; which theſe authors judging (as was then the cuſtom) only by the eye, miſtook for Cryſtals, and preſerv'd them in their Muſeums, and figur'd them as ſuch.

SERIES III.

CLASS III. ORDER II. GENUS III.

DITRIHEDRIA.

PELLUCID and cryſtalliform Spars, compos'd of two pyramids, join'd baſe to baſe, without an intermediate column, hexaedral, or compos'd of two trigonal pyramids.

1. *Ditrihedrium, pyramidibus longioribus, mucronatis. Ditrihedrium, with long and pointed pyramids.*

This is a ſpecies which were it without the character of its being compos'd of only ſix planes, wou'd be diſtinguiſh'd at ſight from all the before deſcrib'd, by the extream length and narrowneſs of its pyramids. It is but of an impure texture, and often clouded thro' with earth, and appearing very coarſe. It is compos'd of two trilateral pyramids, join'd baſe to baſe very regularly and evenly, and each compos'd of three very equal planes, all being of the ſame length, and ſcarce at all, unleſs accidentally, differing in breadth. They are all very long, very narrow, and terminate each in a fine ſlender point; this is indeed often found broken off even while it lies in the ſtrata, and the end render'd obtuſe and irregular; but in this caſe the ſurface of the broken part examin'd, will always ſhew that it was not the original termination of the body. It is found of various ſizes, from a ſixth part of an inch, to near two inches in length, and is never more than a fourth part of its length in thickneſs. Its ſurfaces are all ſmooth and equal; and it is naturally of a pale whitiſh brown, but is ſubject to other colours from accidents at the time of its concretion; it has but a little ſhare of tranſparence, and in its pureſt ſtate very little luſtre or brightneſs.

It is moderately heavy, and very ſoft, and eaſily ſcratch'd.

It will not give fire with ſteel.

It ferments violently with, and is diſſolv'd by Aqua Fortis.

Examin'd by the Microſcope it appears very duſky, and if any where near the baſe of the pyramids its ſtructure can be ſeen, is found to be compos'd of numerous, very thin and fine plates.

It is found in the mines of Cornwall, and ſome other parts of England, and is uſually found ſingle when large, and in cluſters when very ſmall.

It is probable, from the conſtancy of this Order in theſe regularly concreted bodies, that the different ſtate of the ſuſpended ſparry matter from the different quantity of the fluid it is mix'd in, and the ſwiftneſs or ſlowneſs of its evaporation, concretes either into ſeparate bodies at once, or more leiſurely into the larger; and that that very quantity of matter, which in a fluid ſlowly evaporated, and therefore ſlowly concreting, lodges itſelf at one time on the plane of an already form'd pyramid, and is by the ambient fluid dilated there, would, if the fluid had been evaporated more haſtily, have form'd itſelf at once into a Spar of its own form; and that theſe little ones for the ſame reaſon receiving but few additions of matter afterwards, would therefore remain ſmall: this opinion is in ſome degree countenanced by the roughneſs of the ſurfaces of theſe ſmall cryſtallizations, which are always leſs equal than thoſe of the larger bodies of the ſame ſpecies, as muſt naturally happen from the hurry of their cryſtallizations; and yet more ſo by the great analogy between the configuration of theſe bodies and of ſalts; ſince we know that the ſame ſaturated Menſtruum, if evaporated ſlowly will form large and fair, if haſtily ſmall and rude Cryſtals.

2. *Ditrihedrium, pyramidibus longioribus, latis.*
Ditrihedrium, with long and broad pyramids.

This is of a conſiderably impure, coarſe and unequal texture, but is much finer in ſome ſpecimens than in others, and often in one part than in another of the ſame ſpecimen; it is ſeldom without ſome admixture of earth, tho' the proportion of it is different, and differently diſpos'd in the various ſpecimens: In ſome it is diffus'd all over the maſs, and in others is only lodg'd in form of ſpots in it. It is compos'd of two conſiderably long pyramids, join'd baſe to baſe; they are always very exactly of the ſame ſize and ſhape in the ſame ſpecimen, and are conſiderably thick at the baſe, and end in an obtuſe point; they are each of them made up of three planes all very regularly of the ſame length, but one of the three always ſo much broader than the reſt, that the whole pyramid is made to appear broad and flat, and theſe broader planes being always apply'd at the commiſſure exactly to one another, the whole body conſequently alſo appears ſo. It is of various ſizes, from the eighth part of an inch to two inches in length, and is the broader way uſually conſiderably more than the third part of its length in diameter; it is very ſmooth and even on all its ſurfaces, but is ſeldom pure enough to have any great gloſs. It is at times of a whitiſh, greyiſh, yellowiſh or reddiſh, but moſt frequently of a pale brown colour, and according to its foulneſs is differently tranſparent.

It is moderately heavy and ſoft, being eaſily ſcratch'd.

It will not give fire with ſteel.

It ferments very briſkly with Aqua Fortis, and is in great part diſſolv'd by it.

It calcines to a pale fleſh colour.

Examin'd by the Microſcope it appears variouſly ſoil'd and foul'd by earth; and when its ſtructure is viſible is ſeen to be made up of very thin cruſts.

It is frequently found looſe in the perpendicular fiſſures, or horizontal intervals of the ſtrata in the alabaſter quarries near Blankenberg in Germany; and is there ſometimes found ſingle and large, but oftner ſmall and very numerous in the leſſer cavities.

3. *Ditrihedrium, pyramidibus brevibus, latis.*
Ditrihedrium, with ſhort and broad pyramids.

This is a ſingularly pure cryſtalline and beautiful Spar; it is of an extreamly fine and clear texture, very free from all ſpots and blemiſhes, and of a very determinate and regular form, being ever made up of two broad, thick and very ſhort pyramids join'd baſe to baſe. The ſhortneſs of theſe makes the whole body very ſhort in proportion to its thickneſs, and it is of various ſizes, from half an inch to an inch and half in length; it is ſeldom found ſmaller than the leaſt of theſe meaſures, and oftner near the largeſt; it is uſually of a ſomewhat greater meaſure in diameter than in length. The planes of the pyramids, which are three in each, are very regular in ſize, no one of them being greatly broader or narrower than the reſt, and they are ſo exactly of a length, that the ſummits of the pyramids always ſtand regularly in a line with one another, and very regularly in the center of the body: The planes are all extreamly ſmooth and polite, and very bright and gloſſy, it is uſually perfectly colourleſs, except for a very faint caſt of the whitiſh hue ſo natural to the Spars; but it is ſometimes found reddiſh, yellow, and of other colours; it is conſiderably pellucid, and brighter than moſt of the Spars; and when pure might be eaſily miſtaken for Cryſtal.

It is moderately heavy, and ſomewhat harder than the moſt of the Spars, a knife point however readily ſcratches it.

It will not give fire with ſteel.

It ferments violently, and is entirely diſſolv'd in Aqua Fortis.

It calcines to a pale blueiſh grey.

Examin'd by the Microſcope it appears very like Cryſtal, but without its luſtre; and where its texture can be diſtinguiſh'd, is ſeen to be compos'd of extreamly thin plates like thoſe of the foliaceous Talcs.

It is found in the mines of Rammelſburg, and in ſome of the others in the Hartz foreſt; and is ſometimes ſingle, but more frequently lies in cluſters of four or more together, tho' they ſeldom cohere one to another.

4. *Ditrihedrium, pyramidibus breviſſimis, depreſſis.*
Ditrihedrium, with extreamly broad, depreſs'd pyramids.

This is a very ſingular body, and one whoſe very name is ſufficient to diſtinguiſh it from all the other ſpecies of this Genus; it is of a ſomewhat miſty and obſcure, tho' not very coarſe texture, and is commonly the ſame throughout, and in all ſpecimens, being ſeldom either ſpotted or ſtain'd thro' with any other colour; it is compos'd of two very broad and extreamly ſquat and flat pyramids, looking as if they had ſuffer'd ſome external violence, and been forcibly preſs'd together by their baſes. What is properly the length of theſe bodies, that is, from point to point of the pyramids, is ſcarce any thing in this ſpecies, the very ſummits not being a quarter of an inch aſunder in a ſpecimen of three quarters of an inch broad, which is the moſt frequent ſtandard for the ſize of this ſpecies: ſo that the whole much reſembles a wheel. The planes of the pyramids, which are only three in each, are extreamly broad and very regularly ſo, no one of them being either much broader or much narrower than the reſt; they are all of very ſmooth and even ſurfaces, and the whole body is uſually tolerably bright and tranſparent, and of a greyiſh white.

It is moderately heavy, very ſoft, and eaſily ſcratch'd with a knife.

It will not give fire with ſteel.

It ferments violently with, and is entirely diſſolv'd by Aqua Fortis.

It very freely calcines to a pure white.

Examin'd by the Microſcope, the edges ſometimes diſcover the commiſſures of the plates, which are very ſmall and fine, and laid almoſt evenly and horizontally.

It is found in the alabaſter quarries at Blackenburg, and ſometimes in the mines of Goſſelaer, but is uſually met with ſingle.

5. *Ditrihedrium, pyramidibus brevibus, mucronatis.*
Ditrihedrium, with ſhort, but ſharp pointed pyramids.

This is a not leſs ſingular kind than any of the before deſcrib'd; it is of a moderately fine and clear texture, but is frequently full of ſpots and blemiſhes, and ſometimes has an opake earthy matter entirely diffus'd over it; it is form'd of two pyramids, join'd regularly and evenly baſe to baſe; theſe are conſiderably broad at their baſes and are but ſhort, but are very remarkably pointed at their tops, the plates that compoſe them all becoming extreamly narrow near the ſummit; it is, however, ſhort in proportion to its thickneſs, and is often found very ſmall, but ſometimes to as far as an inch in length. Its pyramids are each compos'd of three planes, one of which is always remarkably ſmaller and narrower than the reſt; they are all however nearly of the ſame length, and the ſummits or narrow points of both pyramids ſtand very regularly in the centre of the body; the ſurfaces of all theſe planes are very even, ſmooth and polite, and the whole body moderately tranſparent, tho' of no great brightneſs: It is uſually of a pale yellow, but is ſometimes, tho' leſs frequently, of a dead whitiſh, and ſometimes of a pale brown.

It is moderately heavy, but very ſoft and eaſily ſcratch'd.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis, and is entirely diſſolv'd by it.

It calcines, if yellow, to a pale red; if of any other colour, to a whitiſh grey.

Examin'd by the Microſcope, it ſhews its ſtructure, wherever it happens not to cloſe exactly at the commiſſure of the pyramids, or to have the leaſt edge of a plane ſtand out beyond the oppoſite one, and is then ſeen to be compos'd of almoſt innumerable extreamly thin flakes.

It is found in the mines of the Hartz foreſt in conſiderable plenty; ſometimes the ſpecimens are found ſingle and ſeparate, but more frequently they are lodg'd ten, twelve or more together, ſometimes looſe, but at other times cohering together, where they touch and croſſing one another at different angles.

I once ſaw a few ſpecimens of it on Mendip-Hills, but have not heard of it in any other part of England.

SERIES III.

Class III. Order III. Genus I.

HEXAEDROSTYLA.

Cryſtalliform columnar Spars, terminated at their ſummit by a pyramid, but adhering irregularly to ſome other body at their baſe. Dodecahaedral or compos'd of an hexangular column, terminated by an hexangular pyramid.

1. *Hexaedroſtylum gracile, pyramide longiore.*
Slender Hexaedroſtylum, with a long pyramid.

This is ſo pure and clear a Spar, and ſo much of the ordinary figure of the hexangular Cryſtal, that I doubt not but it has often been miſtaken for Cryſtal; it is of an extreamly fine, pure and equal texture, but is frequently ſubject to the flaky flaws common in Cryſtals. It is ever very regular in its figure, and is a long and ſlender hexangular column, terminated by a very long and moderately ſharp pointed hexangular pyramid; it is of various ſizes, but its moſt frequent ſtandard is nearly two inches, with which length it has rarely more than a third of an inch in thickneſs, and its pyramid uſually takes up about one fourth, or nearly that, of its length. Its pyramidal planes are nearly all of a breadth, but if there be any viſible difference, it is that two of them are ſomewhat broader than the other four, and withal a little longer; the pyramidal planes are all of an extreamly ſmooth, polite and gloſſy ſurface, but the columnar are two much broader than the other four; theſe are join'd to and propagated from the broad pyramidal planes, but greatly exceed their proportion to the reſt; the ſides of all the columnar planes, but eſpecially of theſe two, are ridg'd with very ſlender and very diſtant tranſverſe ſtriæ. The whole body is of the colour and appearance of the coarſer Cryſtals tolerably tranſparent, but with leſs brightneſs than thoſe, and of a whitiſh hue; it is ſubject, however, to be ting'd with all the colours of the Gems, and is ſometimes throughout, ſometimes only at the points, of a red, yellow, green, &c. and generally has the colours very lively and beautiful.

It is moderately heavy, but ſoft and eaſily ſcratch'd by a knife.

It will not give fire with ſteel.

It ferments with and is diſſolv'd by Aqua Fortis.

It calcines freely to a pure white.

Examin'd by the Microſcope, the ridges of the columnar planes appear plainly the edges of ſo many congeries of extreamly minute plates; but theſe collections of them ſeem of no determinate thickneſs, and thence the ridges are of different heights.

It is found in the mines on Mendip-Hills, but no where more plentifully than in the well known cavern called Ookey-Hill, near Wells; the ſides of the caverns there are in many places lin'd with cluſters of it.

2. *Hexaedroſtylum, pyramide longiore, irregulari.*
Hexaedroſtylum, with a long, irregular pyramid.

This is of a moderately equal, but ſomewhat coarſe and impure texture, and is ſubject to ſpots of various earths and minerals, and often is ſo alter'd by them as not to be known but by its figure, which it ever keeps regularly to. It is a ſomewhat long, but withal a tolerably thick column, terminated by a long but very irregular pyramid; both are hexangular, but the pyramid has four of its planes ſo remarkably and irregularly larger than the reſt, as to be diſtinguiſhed ſufficiently by it. Theſe are all of different lengths and breadths from one another, but the largeſt is at leaſt four times as big as either of the two ſmaller; theſe are, however, all of extreamly ſmooth and even ſurfaces, and not at all mark'd with lines or ſtreaks of any kind; the columnar which are propagated from theſe, anſwer them pretty regularly in breadth, and are proportionably ſhorter as theſe are longer; they are all of ſomewhat gloſſy ſurfaces, and appear ſmooth and plain to the firſt view; but held in a proper light they are ſeen to be full of very cloſe and fine tranſverſe ſtreaks. It is naturally of a duſky white, and but moderately tranſparent, and has not much brightneſs.

It is conſiderably heavy, but very ſoft, and eaſily ſcratch'd.

It will not give fire with ſteel.

It ferments and is diſſolv'd in Aqua Fortis.

It freely calcines to a faint blueiſh grey.

Examin'd by the Microſcope, the columnar planes ſhew its ſtructure very remarkably plain: tho' the ridges are not very prominent, the plates of which the body is compos'd are thicker and coarſer than thoſe of the generality of theſe bodies, and each of the tranſverſe ſtreaks is ſeen to be only the edge of one of theſe plates.

It is found in the mines of Cornwall and Devonſhire, and is alſo common in thoſe of Germany, but its ſhape makes it uſually miſtaken for a coarſe Cryſtal.

3. *Hexaedroſtylum, pyramide breviſſima.*
Hexaedroſtylum, with a very ſhort pyramid.

This is uſually of a very pure, clear and fine texture, but is ſometimes ſo debas'd by earthy admixtures that it becomes very coarſe; and is frequently ſpotted, flaw'd and blemiſh'd; it is a regular hexangular column, terminated by an hexangular but very ſhort pyramid: It is of various ſizes, but about an inch and half is its moſt frequent length; and with that the uſual proportion is about half an inch in thickneſs, and the pyramid ſeldom takes up more than one eighth of the length. The planes of the pyramid are ever four a little longer and broader than the other two; theſe are pretty regularly of the ſame length one with another, and both theſe and the ſhorter are all of extreamly ſmooth and polite ſurfaces; the columnar planes, as they are propagated from theſe, anſwer them pretty regularly in breadth, and are very plainly ſtriated with regular and pretty cloſe lines. It is naturally of a greyiſh white, very tranſparent and of conſiderable brightneſs, but is often foul'd with different colour'd earths, and ſometimes ting'd with the colours of the Gems.

It is moderately heavy, and very ſoft, and eaſily ſcratch'd.

It will not give fire with ſteel.

It is diſſolv'd by Aqua Fortis.

It readily calcines to a greyiſh white.

Examin'd by the Microſcope, it appears compos'd of complex plates; and theſe made up of extreamly minute and thin flakes, reſembling thoſe of the foliaceous Talcs.

It is found in the Derbyſhire mines, and in great plenty in thoſe of the Hartz foreſt, and uſually ſticks in cluſters to the ſides of perpendicular fiſſures.

This Species ſometimes affords us a very remarkable variety, two of its pyramidal planes having, toward the end of its receiving addition of freſh matter, been blended into one; and the whole then making an hexangular column with a pentangular pyramid, and one of the columnar planes having no pyramidal one to anſwer it. A like accident often happens in ſome degree alſo to the other Spars and Cryſtals: one or more of their pyramidal planes receiving a laſt addition of matter, which is not propagated down the columnar ones, and thence make a great irregularity in the proportion of the pyramidal and columnar planes.

SERIES III.

CLASS III. ORDER III. GENUS II.

PENTAEDROSTYLA.

CRyſtalliform columnar Spars, terminated by a pyramid at one end, and adhering by the other to ſome ſolid body; decahaedral, compos'd of a pentangular column, terminated by a pentangular pyramid.

1. *Pentaedroſtylum, pyramide longiſſima.*
Pentaedroſtylum, with a very long pyramid.

This is of a very pure, clear and fine texture, and ſeldom blemiſh'd with flaws or foulneſſes of any kind; it is ever of a regular and perfect form, a long and ſlender pentangular column, with a very long but obtuſely pointed pentangular pyramid; it is found of various ſizes, ſometimes very ſmall, but ſeldom exceeding an inch in length, with this it has generally a little more than a quarter of an inch in thickneſs; and the pyramid uſually makes up more than a third part of the length, if view'd according to its longer planes, for the pyramidal planes are of a very irregular length, two of them being ever much longer than the other three, and much broader; theſe are all of very ſmooth and polite ſurfaces, and the apex or ſummit of the pyramid ſomewhat obtuſe, and not plac'd in the centre of the column; the columnar planes are regularly propagated from the pyramidal ones, and uſually very regularly agree in breadth, each to that it is affix'd to; they appear, on a ſlight view, of a very even, ſmooth, and ſomewhat gloſſy ſurface; but more nicely examin'd, are ſeen to be full of very minute ſtriæ, running tranſverſely over them at different diſtances; it is uſually of a fine cryſtalline hue, tho' ſomewhat leſs tranſparent and bright than pure Cryſtal, but is ſometimes ting'd with the Gem colours, and ſometimes loaded with various earths.

It is conſiderably heavy, and moderately hard, being not ſo eaſily ſcratch'd as moſt of the others.

It will not give fire with ſteel.

It diſſolves in Aqua Fortis.

It readily calcines to a pure, or ſomewhat reddiſh white.

The Microſcope ſhews it to be compos'd of ſingle, and thoſe extreamly fine plates: the tranſverſe ridges are each the edge of one ſuch plate.

It is found in ſome of the mines on Mendip Hills, adhering in cluſters to the perpendicular fiſſures in the ſolid ſtrata.

2. *Pentaedroſtylum, columna craſſiore, pyramide brevi, magna.*
Pentaedroſtylum, with a thick column, and very ſhort and large pyramid.

This is a very ſingular ſpecies, and carries in its name alone a ſufficient diſtinction from all the bodies of this Genus; it is but of a very coarſe, foul and unequal texture, ſometimes ſubject to ſpots and flaws, but uſually ſo duſky and coarſe throughout as not to ſuffer them to be diſtinguiſh'd; it is of a very determinate and regular figure, a ſhort and thick column, terminated by a very large and ſhort pyramid; it is of various ſizes, but about an inch and half ſeems its utmoſt length, and that it is not unfrequently found of; when of this ſize, it is uſually an inch thick in the common diameter of the column, and ſomething more than that near the baſe of the pyramid; the pyramidal planes are all five nearly equal, one only uſually appears ſomewhat narrower than the reſt, but they are all pretty regularly of the ſame length; they are naturally of tolerably ſmooth ſurfaces, and tho' ſometimes in the coarſer ſpecimens they are full of irregular cavities and ſmall holes, yet they are never ſeen at all ridg'd or ſtriated acroſs, they have all, however, this peculiarity, that their outer cruſts ſwell beyond and hang over thoſe of the columnar planes, or properly ſpeaking, many of the outer cruſts of the pyramidal planes reach no farther than the baſes of thoſe planes, not extending to, or propagating themſelves along the columnar planes that join to that part of the pyramid; and hence the remarkable bigneſs of the pyramid in this ſpecies; the columnar planes are propagated from the inner coverings of the pyramidal ones, and regularly anſwer thoſe they are join'd to in proportion, tho' not in their particular breadths; and tho' all the pyramidal planes are broader than the columnar, yet thoſe of the columnar that join the broader or narrower on the pyramid, are alſo the broader or the narrower there; the columnar planes are all faintly and irregularly ſtriated acroſs; and the whole body is generally very coarſe and opake, and of a faint browniſh hue.

It is conſiderably heavy, but very ſoft, and eaſily ſcratch'd.

It will not give fire with ſteel.

It ferments with, and is diſſolv'd by Aqua Fortis.

It very readily calcines to a pale but ſomewhat duſky red.

Examin'd by the Microſcope, the over-hanging edges of the pyramid ſhew the ſtructure of the maſs very beautifully; they are compos'd of vaſt numbers of conſiderably thin plates, cloſely and evenly arrang'd, and adhering firmly one to another, the tranſverſe ſtriæ on the columnar planes are alſo made by the edges of theſe ſingle flakes.

It is found but rarely in the Hartz foreſt in Germany, and there principally about Queſtenberg, on the walls as they are call'd, of the ſubterranean caves frequent there, it is ſometimes colour'd reddiſh or yellowiſh. Dr. Woodward mentions a maſs with large pyramids from the lead mines near Caſhborne in Cumberland, which may poſſibly have been the ſame with this, tho' I have never been ſo fortunate as to meet with it in England.

3. *Pentaedroſtylum, pyramide lata, depreſſa.*
Pentaedroſtylum, with a broad, depreſs'd pyramid.

This is another extreamly ſingular ſpecies; it is uſually of a very fine, clear and pure texture, not often flaw'd with the common blemiſhes of the Cryſtals and Spars, but very frequently beautifully variegated with ſmall ſpecks of yellow, green and other colour'd Marcaſites, which make a very beautiful figure in it; it is extreamly determinate and certain in its form, and is a ſhort pentangular column, terminated by an extreamly flat pyramid, compos'd of the ſame number of planes; it is of various ſizes, but uſually of about half an inch in length, the pyramid ſo depreſs'd that it ſcarce adds to its length at all, and its thickneſs being about half its length. The pyramidal planes are not at all equal in ſize, but they are extreamly certain and determinate in the manner of their irregularities, two of them being always much broader and longer than the other three, and the apex of the pyramid never ſtanding in the center of the column; the ſurfaces of all theſe planes are extreamly ſmooth and polite. The columnar planes propagated from theſe, are regularly anſwerable to them in breadth, and of conſequence are two likewiſe much broader than the other three; theſe are all very plainly ridg'd and unequal on their ſurfaces, the tranſverſe lines which are very frequent on them, being all prominent above the ordinary ſurface, and ſeeming to hang over one another in manner of the tiling of a houſe; it is naturally of a very faint whitiſh caſt, and when moſt pure almoſt entirely colourleſs, but is often ting'd with the metalline colours of the Gems.

It is moderately heavy, and conſiderably hard, and not eaſily ſcratch'd.

It will not give fire with ſteel.

It ferments and is diſſolv'd in Aqua Fortis.

It freely calcines to a pure white.

Examin'd by the Microſcope, its ridges on the columnar ſurfaces appear very plainly the edges of ſeveral complex plates, and thoſe made up of almoſt innumerable ſmall and extreamly thin ones.

It is met with in the mines at Rammelſberg in the Hartz foreſt, but no where elſe ſo far as has yet been found.

SERIES III.

CLASS III. ORDER III. GENUS III.

TRIEDROSTYLA.

CRyſtalliform columnar Spars, terminated at one end by a pyramid, and at the other fix'd to ſome hard body, hexaedral, or compos'd of trigonal columns, terminated by trigonal pyramids.

1. *Triedroſtylum gracile, pyramide longiore, obtuſa. Slender Triedroſtylum, with a long obtuſe pyramid.*

This is one of the moſt frequent of all the columnar Spars, but it puts on ſo many various forms, that it may eaſily miſlead any one who examines it without knowing its fix'd character, to imagine its varieties ſo many different ſpecies; it is generally of a ſomewhat coarſe and impure texture, conſiderably opake, and of a duſky hue on the ſurface, tho' ſometimes it is tolerably clear and fine, from a leſs than ordinary admixture of earth in its original concretion; as it is alſo ſometimes very foul from a greater debaſing of this ſort. Its uſual colours alſo are either white, or yellow, but it varies from theſe according to the nature of the earth it has taken up, into reddiſh, a blueiſh grey, or a pale brown, and is beſide all this, frequently ting'd with the colours of the Gems. Its ſize is not leſs various than the reſt, it is often found two inches long, in ſingle and very beautiful columns, but more frequently of leſs than the ſixth part of an inch, and in cluſters of millions together, form'd into a ſort of cruſt, and with their columns confus'd, adhering to, and running into one another, and only the pyramids, or theſe with a very ſmall portion of the column appearing ſeparate; with all theſe variations, however, and under all theſe changes, the ſo much lamented occaſions of the uncertainty of characters in the mineral kingdom, this body, than which no one can be more affected by them, is always to be known from every other ſpecies of this extenſive claſs by a cloſe attention to its true characters, which it always in the deepeſt of its diſguiſes invariably preſerves; the moſt obvious notices of bodies are in theſe and ſome other claſſes of Foſſils altogether vague and uncertain. The ſize of this is accidental, and owing merely to the ſtate of concreting matter, as has been obſerv'd in another place; and its colour, as alſo more or leſs opacity, are merely adventitious, and no inherent or neceſſary qualities in the body, conſider'd as a ſpecies; its ſhape is ever fix'd and determinate, (as is alſo its ſtructure,) and will as certainly diſtinguiſh it in all its diſguiſes, as that of the Cryſtals of the various ſalts when pure and perfect diſtinguiſhes them from others of the ſame colour; this is ever a long and ſlender trigonal column, terminated at the top by a long and trigonal but very obtuſe pyramid, the planes of this are irregular in length and breadth, but are perfectly certain and determinate in this irregularity, one of them being always broader and longer than the other two; they are of very ſmooth and even ſurfaces, but never very polite or gloſſy, and are often cover'd with a ſeeming thin coat, of a yellowiſh or whitiſh opake matter extending alſo over a part or all of the column; the columnar planes are plainly propagated from theſe, and pretty regularly anſwer them in breadth; theſe are of a more duſky hue than the pyramidal, and appear ſmooth at firſt ſight, but more nicely and cloſely examin'd they are found to be thickly ridg'd with tranſverſe and ſomewhat prominent ſtriæ.

It is of moderate weight, and conſiderably hard, and not ſo eaſily ſcratch'd as many other Spars.

It will not at all give fire with ſteel.

It ferments with and is diſſolv'd by Aqua Fortis.

It very freely calcines to a pure white if colourleſs, but if ſtain'd with any of the beforenamed colours, to a paler or ſtronger red.

Examin'd by the Microſcope, the columnar planes appear plainly compos'd of flakes, or plates propagated from the pyramidal ones, and the ridges are diſtinctly ſeen compos'd of the extremities of vaſt numbers of extreamly minute and thin flakes.

It is found in moſt parts of the world. In the mines of Germany 'tis very common in ſingle large ſpecimens; in Devonſhire we have it alſo in the ſame ſtate: But it is more frequent with us in ſmall conjunct ſpecimens, and in form of cruſts, in which ſtate almoſt all our ſtone quarries abound with it. The quarry men of Godſtone in Surry, from whence I have been favour'd with ſpecimens of it by Mr. Da Coſta, call it Soder.

2. *Triedroſtylum, pyramidibus brevioribus, mucronatis.*
Triedroſtylum, with ſhort, but pointed pyramids.

This is frequently of a pure, clear, and fine texture, and is leſs ſubject to be ſpotted or obſcur'd by earthy matter than many other of the Spars. It is of a very regular and determinate figure, a ſomewhat ſhort and moderately thick column, terminated by a ſhort and broad, but finely pointed pyramid. It is found of various ſizes, from the tenth or twelfth part of an inch, to two inches or more in length. Its pyramidal planes are nearly equal in ſize, but if accurately examin'd, one of them will be always found a little ſmaller than the other two; theſe are of very polite, ſmooth and gloſſy ſurfaces, and are remarkably broad at their baſes, and run up into fine narrow points at their ſummits. The columnar planes are evidently propagated from theſe, but the two larger are here more diſproportionate to the ſmaller plane, the matter they are form'd of having generally ſpread itſelf a little beyond its due bounds; theſe appear perfectly ſmooth and even to the naked eye, no tranſverſe ſtreaks being diſcoverable on them in any light.

It is uſually of a whitiſh hue, but often almoſt entirely colourleſs, and is in its pureſt ſtate extreamly tranſparent, and of a brightneſs at leaſt equal to that of any of the Spars.

It is moderately heavy, but very ſoft and eaſily ſcratch'd.

It will not give fire with ſteel.

It ferments violently with, and is perfectly diſſolv'd by Aqua Fortis.

It freely calcines to a pure white.

Examin'd by the Microſcope, the pyramidal planes appear perfectly ſmooth, but the columnar are diſcover'd to be ridg'd with extreamly minute ſtriæ, which ſeem to be the edges of the ſingle plates of which this body is compos'd.

It is found in many parts of England. I have ſeen it in conſiderable plenty in the caverns on the Southern part of Mendip Hills, ſometimes in very large, and at others in very ſmall and conjunct parcels, forming cruſts on the ſide of the caverns, but ſeldom well ting'd with the Gem colours.

3. *Triedroſtylum craſſius, pyramide longiore.*
Thick Triedroſtylum, with a longer pyramid.

This is of a modrately fine, pure and clear texture, but often obſcur'd by large clouds of a reddiſh brown earthy matter, and ſometimes blended with it, thro' its whole ſubſtance. It is very determinate in its form, being ever a thick column, with a long pyramid; but both the column and pyramid having a very remarkably flat look. It is found of various ſizes, but more frequently of about half an inch in length, and very little leſs than that in thickneſs. The pyramid takes up uſually more than half its length, and is compos'd of three unequal planes, one of them being greatly broader, tho' not much longer than the reſt; theſe planes are all of a ſmooth, polite ſurface, and often tolerably bright and gloſſy. The columnar planes are evidently propagated from theſe, and regularly anſwer them in breadth, and the larger of theſe exceeding that of the pyramid in breadth, gives the ſame remarkable flat look to the column, that the other does to the pyramid; theſe are all very plainly ſtriated acroſs, the ridges being plac'd at irregular and ſmall diſtances. It is uſually of a pale browniſh hue, with ſome faint admixture of rediſhneſs, but it is alſo ſometimes yellowiſh, and at others of a pure, but opake white.

It is moderately heavy and conſiderably hard, and not ſo eaſily ſcratch'd as the common Spars.

It will not give fire with ſteel.

It ferments violently with, and is diſſolv'd in Aqua Fortis.

Examin'd by the Microſcope, the ridges of the columnar planes appear plainly the edges of the ſeveral complex cruſts it is compos'd of, and are plainly propagated from the pyramidal planes to which they join.

It is found on the ſides of the perpendicular fiſſures of the ſtone pits of Northamptonſhire, and in many other parts of the kingdom.

4. *Triedroſtylum, columna breviſſima, pyramide obtuſa, longa.* *Triedroſtylum, with a very ſhort column, and long, obtuſe pyramid.*

This is uſually a coarſe and impure Spar, and of a duſky complexion, when broken. It is uſually found very foul and full of ſtains and flaws; but when whole, its general obſcurity makes theſe blemiſhes ſcarce at all diſtinguiſhable in it. It is of a very determinate figure, being always a very ſhort and very regularly trigonal column terminated by a very remarkably long and ſlender pyramid, in like manner regularly trigonal; its planes are all ſomewhat rough and unequal, and frequently have ſmall irregular cavities, as is common in thoſe of the more impure ſpars, but they are never ridg'd or ſtriated acroſs. The columnar planes are all regularly of the ſame length and breadth one with another, as are the planes of the pyramid from which they are propagated; and are of a ſomewhat duſky, and very plainly and deeply ridg'd ſurface, the ridges all running regularly and evenly acroſs the planes, and all being at nearly equal diſtances from one another, and conſiderably numerous for thoſe of ſo ſhort planes.

It is uſually of a deep duſky browniſh hue, with very little brightneſs, and leſs tranſparence.

It is conſiderably heavy, but very ſoft and eaſily ſcratch'd.

It will not give fire with ſteel.

It very violently ferments with Aqua Fortis, and is almoſt entirely diſſolv'd by it.

It readily calcines to a very faint fleſh colour.

Examin'd by the Microſcope, the ridges all appear the edges of ſo many ſingle, but conſiderably thick cruſts of which the column is compos'd.

It is very frequent in the mines of Germany, and not leſs ſo in thoſe of England; the lead mines of Derbyſhire abound with it, as do alſo the ſtone quarries of Somerſetſhire, but it is moſt frequently found ſmall.

SERIES III.

CLASS III. ORDER IV. GENUS I.

HEXAPYRAMIDES.

PYRAMIDAL, cryſtalliform Spars, affix'd to no column, but adhering to ſome ſolid body, by the baſes of their pyramids. Hexaedral or compos'd of ſingle hexangular pyramids.

1. *Hexapyramis brevior, baſi latiore.*
Short Hexapyramis, with a broad baſe.

This is a very ſingular and very beautiful body, and gives the eye no other idea than that of the pyramid of a large hexangular Cryſtal or Spar, cut off at the baſe, and artfully affix'd to the ſide of a perpendicular fiſſure or plate of ſtone.

It is of a very pure, clear and fine texture, and ſeldom flaw'd or obſcur'd by ſpots. It is ever of a determinate figure, and from a very broad baſis, riſes into but a ſhort and obtuſe pyramid; the planes are not very irregular in ſize, but if nicely examin'd, will be found to be four ſomewhat broader and longer than the other two; and the ſummit of the pyramid for that reaſon does not ſtand exactly in the centre, tho' very nearly ſo. The planes are all very ſmooth and polite, and have not the leaſt appearance of ridges, or indeed of any other inequality on their ſurfaces. It is often almoſt entirely colourleſs as Cryſtal, but uſually has a faint caſt of whitiſhneſs, that takes off from its luſtre and tranſparence, and is ſometimes, tho' leſs frequently than moſt other of the Spars, ting'd with various colours of the Gems, but principally with a purple or yellow.

It is conſiderably heavy, and moderately hard; it may, however, be ſcratch'd by a knife.

It will not give fire with ſteel.

It ferments with, and is entirely diſſolv'd by Aqua Fortis.

It freely calcines to a pure white.

It is a very rare ſpecies, and is found, ſo far as is hitherto known, only in the great mine at Goſſelaer in Saxony.

2. *Hexapyramis, longior & mucronatus, baſi anguſtiore.*
Long pointed Hexapyramis, with a narrow baſe.

This is but of a moderately pure, and often indeed of a conſiderably foul and coarſe texture, and is ſeldom when fineſt, found without ſmall ſpots of metalline particles of marcaſites, or of a whitiſh earth. It is ever of a determinate form, a long and pointed pyramid, adhering to no column, but affix'd by its narrow baſe to ſome other body; the ſpecimens of it are of very different ſizes, ſome not exceeding a barley corn in length, others riſing to near an inch, but all equally ſlender in proportion to their length, and all very finely pointed; the planes are very nearly equal to one another, but two of them if cloſely examin'd will be found a little broader and longer than the reſt, and the ſummit is by that means thrown a little out of the center of the body; the ſurfaces of all the planes are perfectly ſmooth, but according to the purity of the ſpecimen, they are differently bright, and the whole ſometimes very fairly pellucid, ſometimes ſcarce at all ſo; it is uſually of a whitiſh hue ſpotted with ſmall ſpecks of a pure white, of black, and of a braſſy marcaſite; but it is at times alſo ting'd with the colours of the Gems, and that in ſome inſtances by fine, light, metalline admixtures, in others by the coarſer earths.

It is moderately heavy, and conſiderably hard.

It will not be ſo eaſily ſcratch'd as many others.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis.

It calcines freely to a pure white, or duſky pale red.

Examin'd by the Microſcope when broken from the matter it was affix'd to, is diſcover'd to be compos'd like the reſt, of flat parallel plates, but theſe ſingly cover the whole plane they are apply'd to, as they do the pyramidal planes of the columnar ones, ſo are not ſeen in ridges or tranſverſe lines on the ſides.

It is found in the alabaſter quarries of the Hartz foreſt adhering to the perpendicular fiſſures of the ſtone, but is uſually ſmall.

SERIES III.

CLASS III. ORDER IV. GENUS II.

TRIPYRAMIDES.

PYRAMIDAL, *cryſtalliform Spars without columns, compos'd of ſingle pyramids affix'd by their baſes to ſome ſolid body: trigonal, or conſiſting of ſingle triangular pyramids.*

1. *Tripyramis, brevior & craſſa.*
Short and thick Tripyramis.

This is a beautiful ſpecies, but of a conſiderably foul and coarſe texture, and always ting'd with the colour of ſome of the lighter earths; it is frequently ſpotted, and ſometimes as it were vein'd with a very elegant pale red, from a fine earth of that colour, mixing itſelf with the matter of one of the cruſts, and that but imperfectly, or not ſpreading evenly with it; theſe blemiſhes, if they are to be call'd ſo, are found only near the top of the body, and it is ſeldom ſubject to ſpots of any other kind, whatever other colour it receives, being always equally diffus'd thro' it. It is ever determinate in its form, a ſhort thick pyramid with a broad baſe, and a tolerably ſharp point; it is found of various ſizes, from an eighth of an inch to half an inch in length, and is very near equal to its length in thickneſs at the baſe; the three planes of which it is compos'd, are very nearly equal, one only being a little narrower tho' no ſhorter than the other two; the ſurfaces of theſe are all conſiderably ſmooth, even and polite, and not the leaſt trace of a ridge or tranſverſe line is ever to be ſeen on any of them; it is moſt frequently of an agreeable pale brown, but ſometimes yellow, and ſometimes of other colours.

It is moderately bright, but of very little tranſparence, and conſiderably heavy, but ſoft, and eaſily ſcratch'd.

It will not give fire with ſteel.

It ferments with and is diſſolv'd by Aqua Fortis.

It very freely calcines to a red of different degrees, ſometimes whitiſh and pale, at others very deep and ſtrong, according to the nature and quantity of the earth it has taken up in concreting.

Examin'd by the Microſcope, it ſhews its ſtructure where broken near the baſe, and its outer cruſts are ſeen very thin and beautiful, and more reſembling the ſpangles of the foliaceous Talcs than any other ſubſtance.

It is found on the ſides of the ſtacks of ſtone, as they are call'd in Northamptonſhire and in ſome other counties, but it is not common, and is uſually ſmall.

2. *Tripyramis longior, baſi auguſtiore.*
Long Tripyramis, with a narrow baſe.

This is uſually of a very coarſe texture, and often ſtain'd and blemiſh'd with various colour'd earths; it however, is always of the ſame determinate and regular form, a long, erect and narrow trigonal pyramid, affix'd to ſome hard body by a narrow baſe, and terminating in a tolerably ſharp point; it is found from the tenth part of an inch to near an inch in length, and is very rarely ſo much as of one third of its length in thickneſs; it is compos'd of three planes, all very regularly of the ſame length, but the one of them conſtantly more than as broad as the other two together, ſo that the whole pyramid has ever a remarkably flat look: the ſurfaces of all the planes are perfectly ſmooth and even, not the leaſt inequality or appearance of a tranſverſe line ever appearing upon them. It is uſually of a deep and duſky brown in colour, but ſometimes of a very pale one; ſometimes of an opake but bright and even milky white, and at others reddiſh, or of a good yellow; it is, however, always obſcure, and of very little brightneſs.

It is conſiderably heavy, and not ſo ſoft or eaſily ſcratch'd as moſt other kinds.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis, and is almoſt totally diſſolv'd by it, nothing remaining but the earth it had taken up in concreting.

It very freely calcines to a white, grey, or red, according to the nature of the earth it has taken up.

Examin'd by the Microſcope, no traces of its ſtructure are to be ſeen on any part of its natural ſurface; but its baſe when broken from the body it was affix'd to, ſhews in its outer part the commiſſures of many very thin and fine plates.

It is uſually found in ſmall ſpecimens, and in great numbers together, but more rarely large and ſingle; we have it not in England that I know of, but it is common in the German mines.

Theſe are the various ſpecies of the cryſtalliform Spars, ſo far as they yet ſeem known to the world; and a long courſe of obſervation, and dilligent enquiry into their nature in the places where they are produc'd, ſo far as my ſhort travels have reach'd; or the cabinets of the curious here, and the help of intelligent and induſtrious correſpondents in other parts of the world, either from the mines themſelves, or from the curioſities brought from them to the cabinets of the learned and illuſtrious there, could determine.

A ſanguine imagination might eaſily have made twenty times the number of ſpecies from the accidental varieties of theſe, but this were to confound, not to inſtruct; that more ſpecies, and even more Genera than thoſe here deſcrib'd, may be hereafter diſcover'd, I think extreamly probable, and ſhould be moſt happy to ſee them; the places of ſuch under theſe Orders will eaſily be aſcertain'd, and new Genera, if ever diſcover'd, will fill up ſome neceſſary gaps left here till that time.

I cannot but think it extreamly probable, from the analogy of nature in all her works, that as there are hexangular, pentangular and trigonal columnar Spars, with their pyramids; and as there are alſo hexangular and trigonal pyramidal Spars without columns, that there are alſo pentangular ones of this Order, and ſo of the reſt of the angular figures, as well indeed of Spar as of Cryſtal; but as theſe pentangular pyramids of Spar, if there are ſuch, have never yet been diſcover'd, and ſo of many of the other intermediate figures of the other orders; in a work where things that had been ſeen and known of, were alone to be deſcrib'd, nothing more than conjecture can have a place in regard to them: if any future naturaliſt, however, ſhould diſcover a pentangular pyramid of Spar without a column, he may congratulate himſelf on the diſcovery of a new Genus of Foſſils, he will find its place very readily between the firſt and ſecond Genera of the fourth Order here, and will eaſily know it can no where elſe be placed but between the hexangular and trigonal Spars of that order.

This may ſerve as a general rule for the hereafter to be diſcover'd Genera, of theſe angular bodies; but, it may be a neceſſary caution to the young ſtudent, that he be not too haſty to eſtabliſh them on mutilated ſpecimens, ſince broken angles from ſuch occaſions, are only to be look'd on as accidental varieties; theſe bodies being in all the Genera, ſubject to ſuch as the bodies moſt analogous to them, the various ſalts alſo, are in their concretions, of which many are from the two haſty evaporation of the water, or ſome other accidents ſo mutilated, as to be compos'd of a different number of planes from the perfect Cryſtals of the ſame ſalt, and not to be known to belong to it, but by compariſon in their other qualities.

As theſe bodies uſually appear in cluſters, it will be well on theſe occaſions to examine the whole congeries, ſince tho' ſome are mutilated, others are generally perfect in the ſame maſs. This may be a proper caution to avoid imaginary diſcoveries, and will give a greater certainty to the real ones.

The compactneſs of the ſtructure of many of theſe Spars, is very ſurpriſing; it ſhould be imagin'd that they would naturally break in the direction of their plates, but the commiſſures of theſe are ſo firm, that they break as eaſily any where elſe, and indeed equally in all directions; nay, ſo true and firm is the union both of theſe and of the inſenſible particles of which they are compos'd, that many of them, wherever they are broken, yield a ſmooth and poliſh'd ſurface, and ſeem at firſt ſight as if compos'd of plates laid evenly that way; the only thing that ſhews the contrary is, that they break with equally ſmooth and poliſh'd ſurfaces, in a contrary, or even in any oblique direction.

Truly plated Spars indeed we have in England, emulating the figure of irregular columns, but they are always rude and irregular; theſe are the ſportings of nature with ſome of the Spars of the following kinds, and are never of any determinate ſhape; or any two even in the ſame maſs perfectly alike; and are all compos'd of plates laid obliquely on one another.

I ſhould not conclude the hiſtory of theſe bodies, without publickly acknowledging my gratitude to the great inſtrument of my certainty in regard to many of them: Monſ. Le Febure, who with indefatigable pains, has enquired in Germany after all the bodies of this kind to be met with there, and that not only in the mines, but in the cabinets of the collectors, to whom alſo I am not leſs indebted, ſince the love of knowledge, and deſire of ſeeing a work of this extenſive kind as perfect as might be, have made them even commit an end of their fineſt ſpecimens to Aqua Fortis, or ſtrike them againſt a ſteel, to determine by theſe great and infallible Criterions, to what claſs of Foſſils they really belong'd.

SERIES III.

CLASS III. ORDER V. GENUS I.

PARALLELOPIPEDIA.

PEllucid cryſtalline Spars, externally of a determinate and regular figure, though not columnar or pyramidal; always found looſe, detached, and ſeparate from all other Bodies, and ever in form an oblique Parallelopiped, with ſix parallelogram ſides, and eight ſolid angles; eaſily fiſſile either in an horizontal or perpendicular direction, being compoſed of numbers of thin plates, and thoſe of very elegantly and regularly arranged bodies, each of the ſame form with the whole maſs, except that they are thinner in proportion to their horizontal planes; and naturally falling into theſe and no other figures, or breaking by a ſlight blow.

1. *Parallelopipedium durius perlucidum decolor.*
Cryſtallos Iſlandica authorum.

Hard, pellucid, and colourleſs Parallelopipedium.
The Iſland Cryſtal of authors.

THIS is the ſubſtance ſo much talked of by the writers on optics under the name of Iſland Cryſtal; and deſcribed by Eraſmus Bartholine, Huygens, and Sir Iſaac Newton, on account of its double refraction. Neither the nature nor texture of this famous Body ſeem, however, yet to have been perfectly underſtood; the moſt of thoſe who have written of it having accounted it a Cryſtal, and Sir Iſaac Newton a ſort of Talc. This could never have happened, had the criterions of foſſils been at that time fixed, ſince that great author has recorded its property of making an ebullition with Aqua Fortis, which alone muſt prove that it can be neither Talc nor Cryſtal, both thoſe Bodies being wholly unaffected by that Menſtruum.

It is indeed a true and genuine Spar, as all experiments will prove, and is no ſingle or peculiarly figured Body, but an individual of a regular and numerous Genus. It is of an extremely pure, clear, and fine texture, not at all ſoiled by that whitiſh caſt, common to moſt Spar that is free from other tinges; but is perfectly fine, and very ſeldom either blemiſhed with flaws or ſpots, or ſtained with any other colour.

It is a regularly formed and perfect Body, being always an oblique Parallelopiped, compoſed of ſix planes.

It is found of various ſizes, from a quarter of an inch to three inches in diameter; but its moſt uſual ſtandard is about two inches and an half. Its ſurfaces appear, at firſt ſight, all tolerably ſmooth, even, and polite; but, if nicely examined, they will be found irregularly ridged, ſomewhat in the manner of the columns of the Cryſtals and Cryſtalliform Spars, but with more uneven, waved, and bending lines, not ſtrait and tranſverſe ones. Theſe ridges or lines are really in this alſo what they are in the columnar planes of Cryſtal, the edges of the plates the Body is compoſed of.

What appears indeed very ſingular in this is, that all the ſurfaces are equally thus ridged, and all made up of flat plates, according to the direction of which the ſtone will ſplit equally, either horizontally or perpendicularly. It would be natural to expect, that if the Body were compoſed of parallel plates laid horizontally on one another, and its horizontal planes were therefore compoſed of the flat ſurfaces of thoſe plates, that its ſides and ends muſt be compoſed of the edges of them; and, as in the Selenitæ, and other bodies of that kind, it ſhould be flaky, like the foliaceous Talcs, and eaſily fiſſile that way, but not the other. When we come to examine this Body, however, with the aſſiſtances of glaſſes, we ſoon ſee the reaſon of its ſingular property of ſplitting either way, to be owing only to the regularity of figure, ſmoothneſs of ſurface, and nice joining of the ſeveral ſmaller concretions it is compoſed of.

It is as pellucid, and not much leſs bright than the pureſt Cryſtal. It is moderately heavy, but very ſoft, and is eaſily ſcratched with the point of a pin. It is uſually found ſingle, cluſters of the ſpecimens of it being rarely met with together, and when they are, never cohering one to another.

It will not give fire with Steel.

Thrown into Aqua Fortis, it makes a moderately ſtrong ebullition, though not ſo violent as many other of the Spars, and diſſolves ſomewhat ſlowly, but perfectly, in it.

It very freely calcines to a pure, but opaque white.

It is found in the iſland of Iſland, whence it has its uſual name, but is not peculiar to tò that place. It is found in many parts of Germany and France, where the maſſes of it are always ſingle, and nearly equal to their length in thickneſs. In Iſland, in the ſides of the mountains, in which it is very plentiful, it is ſometimes found in complex maſſes of a great breadth, from ten to eighteen or twenty inches in length, and nearly of half their length in diameter. Theſe are never, however, of more than about two inches in thickneſs, to whatever extent of ſurface they ſpread; and are plainly made up of a number of the perfect ſingle ſpecimens of the uſual ſize, placed ſide by ſide in a beautiful and orderly arrangement, and, to whatever ſize they extend, ever make in the whole a rhomboidal form, like to the perfect maſſes in ſhape, and in all reſpects, but want of thickneſs, and indeed in nothing but ſize differing from the ſmaller concretions of which they are originally compoſed.

Examined by the Microſcope, it exhibits a texture truly wonderful, and moſt beautifully regular. The whole maſs is ſeen to be compoſed of numbers of flat and broad plates, laid evenly on one another, but not cohering very firmly together. Theſe, if ſeparated thinly from the maſs, are found compoſed yet of numbers of others infinitely thinner, and emulating thoſe of ſome of the foliaceous Talcs. Theſe, taken off again as thinly as may be, are found to be compoſed of a moſt beautiful and orderly arrangement of a multitude of ſmall and thin rhomboidal concretions, exactly of the ſhape and figure of the whole maſs, except in thickneſs; and, indeed, as thus magnified, appearing like nothing ſo much as ſo many ſingle plates taken off nicely whole from the horizontal ſurface of the whole maſs. The flakes not only naturally break into theſe regularly figured pieces when they are ſufficiently thin, but they may be ſeen in many places where they have ſuffered ſome little injury in the raiſing, and have had their conſtituent particles diſplaced, plainly marked with tranſverſe and longitudinal diagonal lines, dividing them into theſe rhomboidal maſſes, or rather ſhewing where they cohere to one another to form the plates. When the whole maſs is broke, the plates generally break many together, and the fragments they fall into are of the ſame figured ſurface, but thicker, and more reſembling the perfect maſſes.

The thin and flat rhomboidal concretions, into which the finer plates break, are no farther to be traced by our ſenſes, but ſeem the primary concretions of the matter of the maſs. They are perfectly bright and pellucid, and extremely ſmooth and polite on all their ſurfaces; multitudes of theſe, arranged perfectly evenly, ſide by ſide, form one of the thinneſt plates into which this Body is diviſible, and of which, as ſecondary concretions, it is compoſed. The whole aſſemblage of theſe firſt ſubſiding, form moſt a flat plate of the rhomboidal figure of the whole; and the next quantity of the ſame concretions which ſubſide, appear to have been by the laws of attraction very powerful in theſe minute and cloſely touching Bodies, not only arranged into a plate of the ſame form and dimenſions, but even every individual concretion to have been of exactly the ſame ſize with thoſe of the plate before formed, and each to have been evenly and exactly laid on one of thoſe, and ſo on for all the ſucceſſions through ever ſo many after-formed plates.

I have often flattered myſelf, that I have had before the Microſcope a ſingle and ultimate plate of this Body; when, by more nicely viewing it at the edges, I have found reaſon afterwards to believe I was miſtaken; but, on the flat ſurfaces, a congeries of twenty may appear no way diſtinguiſhable from a ſingle one, ſince the ſeparate concretions which form them all, being laid in ſuch perfect regularity on one another, look only like ſingle ones; and the lines or ſtreaks that mark the commiſſures of the ſeveral ſeries of them are perfectly even, and appear, and indeed are, ſingle lines, in ever ſo thick or compound plates. To this alſo is owing that remarkably fiſſil quality of the ſtone, which makes it ſplit both ways, ſince theſe primary concretions being all perfectly regular, and regularly diſpoſed, and lying perfectly even on one another through the whole congeries of them that forms the maſs, the lines that mark the commiſſures of their arrangements, through the whole Body, cannot but be perfectly even; and their coheſion to one another at theſe commiſſures being leſs firm, than the natural ſtructure of their whole concretions, they cannot but form by the regular continuation of theſe lines made by their commiſſures throughout the whole maſs, ſo many plates; and theſe running perpendicularly, and the parting of the maſs on violence being much eaſier at theſe junctures than through the ſubſtance of the concretions, the whole cannot but appear both plated and fiſſile that way, as well as horizontally, the edges of theſe primary concretions, thus regularly diſpoſed, forming as even and regular, though not as thin plates as their horizontal planes. This, experiment will alſo evince the truth of, the maſs though eaſily fiſſile, perpendicularly, yet never ſeparating that way into ſo thin, nor indeed ſo compact plates. It is not impoſſible indeed but that what appear to us the primary concretions in this Body may be themſelves compound ones, and formed by plates made up of yet ſmaller concretions, ſince the operations of nature ſeem to have the ſame tendency in all the progreſſions of the formation of this Stone, the complete maſſes we know ſerving in Iſland by the ſame regular arrangement as the primary ones, as we call them, to make flat plates, thin in proportion to their extent, a proper number of which would ſerve only to make one great Parallelopiped of the ſame figure with our ſmaller complete one, and formed in that caſe, as ours, of plates made up of theſe regularly figured Bodies; only the ſtructure would be more obvious to the eye, as the ſeveral parts of it would be larger. The ſtructure of this Body, upon the whole, is much the ſame with that of the Phengites Marble of the antients, only that the complex configurations, which in that have ſuffered greatly, by being cruſhed together in a ſucceeding general concretion maſs they form; here have been ſubject to no ſuch general concretion, but remaining ſingle, they more regularly keep their form.

The remarkable property of this Body, for which it has been ſo much talked of by the writers on optics, is, that if it be laid over a black line drawn on a piece of paper, the line is ſeen through it double, or two lines appear in the place of one, both of the ſame ſtrength of colour and thickneſs, and running parallel to one another at a ſmall diſtance. This effect is beſt ſeen through the plain horizontal ſurfaces of the Stone, and there are ſome angles in which it is not produced. If any beam of light falls alſo on this Stone, either perpendicularly, or in any oblique angle, it becomes divided into two beams by means of the ſame double refraction, which beams are of the ſame colour with the incident beam of light, and ſeem equal to one another, or very nearly ſo, in the quantity of their light.

The pureſt Cryſtal has alſo a double refraction, like this Stone in ſome degree, and is very different in its refraction from Cryſtaline Glaſs. The difference of the two refractions from Cryſtal, however, is not ſo great or manifeſt as from the Iſland Cryſtal.

2. *Parallelopipedium mollius albidum hebes.*

Dull, ſoft, whitiſh Parallelopipedium.

THIS is a Body ſomewhat approaching to the former in figure, and even endowed with its remarkable property of a double refraction, in much the ſame degree, but very different from it in colour, purity and brightneſs. It is of a ſomewhat irregular and impure texture, and is very ſubject to the opaque white blemiſhes of Cryſtal, looking like white clouds or flaws. Such ſpecimens, however, of it as are free from theſe, are generally of an equal purity throughout, as it is ſeldom ſubject to ſpots, clouds, or blotches of earth. It is a regularly figured Body, being ever an oblique Parallelopiped, but conſiderably thick in proportion to its length, being often as thick as long. It is found of various ſizes, but moſt frequently is of about an inch and half in length, an inch and one third in breadth, and ſometimes about an inch, ſometimes an inch and half in thickneſs. It is compoſed of a multitude of parallel plates, which run both horizontally and perpendicularly, being each compoſed of a multitude of even Series of ſmall rhomboidal Bodies, laid in oblique directions, and cohering as firmly, and theſe being diſpoſed as evenly in their horizontal as in their lateral ſurfaces, make as even and regular plates by their perpendicular as by their horizontal Series; only theſe are obſervably thicker on their ſides than thoſe on the top and bottom, or horizontal planes of the maſs. Its ſurfaces appear all tolerably ſmooth and polite, but if cloſely examined, they are found ridged with the broken edges of the plates in different irregular undulations. In theſe ridges the plates may alſo be ſeen to be naturally very thin, though in the breaking the Stone they appear very coarſe and thick, being ever many joined together: the fineſt of theſe, however, are much thicker than thoſe of the former Species. It is of an opaque whitiſh hue, though differently ſo in the different ſpecimens; and, in many of them, is of ſome conſiderable brightneſs, and moderately tranſparent. It is conſiderably heavy, and much ſofter than the former kind, and is very eaſily ſcratched.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt perfectly diſſolved by it, leaving only a ſmall quantity of a white Earth.

In the fire it readily calcines to a pure white.

Examined by the Microſcope, its plates appear thicker, and more opaque, than thoſe of the former Species; in ſome ſpecimens the ſtructure of them is but very difficultly traced; in others it is plainly ſeen to be the ſame with the former, as is that indeed of all of this Genus.

It is found in France, Germany, and England. We have it in Derbyſhire and Yorkſhire in our lead-mines; and about Scarborough it is ſometimes found caſt on the ſhore, and rounded there by the motion of the water.

It has the property of giving a double refraction, as the former; but its want of a perfect tranſparency, makes it ſhew it leſs elegantly.

3. *Parallelopipedium albidum lucidiſſimum mollius.*

Soft, whitiſh, very bright Parallelopipedium.

THIS is a very ſingular Species, being extremely more bright, yet not ſo pellucid as the former. It is a very regularly formed Body, being ever of the ſhape of the reſt of this Genus, an oblique Parallelopiped. It is of a tolerably fine, but conſiderably impure texture, and is very ſubject not only to the opaque white clouds ſo common in the fouler Cryſtals, but is often ſpotted or ſtained with other colours by means of ſmall portions of coloured Earths, and is very frequently found impregnated with the metalline tinges. It is found of various ſizes, but moſt frequently of about an inch long, and three quarters of an inch broad, and is of different thickneſſes in proportion to its length; but uſually, in a ſpecimen of an inch long, does not exceed half an inch in thickneſs. It is compoſed of multitudes of parallel plates, which run both perpendicularly and horizontally, ſo that all its ſurfaces are equally tabulated. Theſe plates are conſiderably thick, and ſeem more rigid than thoſe of the other ſpecies. Its ſurfaces all appear tolerably ſmooth on a careleſs view; but, cloſely examined, are found to be very irregularly ridged with the edges and ends of broken or imperfect plates. It is naturally of a whitiſh colour, and, when freſh broken, is of a ſurpriſing brightneſs, not at all inferior to that of Cryſtal; but has very little tranſparency, being all over uſually full of opaque clouds reſembling flaws; and even where theſe are wanting, of a very duſky hue. It is ſubject to all the colours of the Gems, and is found at times yellow, red, green, &c. The yellow it has is uſually foul and pale, and the red much like that of the ordinary Carnelians. It eaſily ſplits, but not into complete or regular plates, but uſually into ſmall parts of plates, conſiderably thick, and eaſily falling into ſmall, but flat parallelopiped concretions of the figure of the whole, but thinner. Theſe plates are not at all elaſtic, but crack and fly into theſe pieces on attempting to bend them. It is moderately heavy; and though it appears very hard and ridged, ſo far as can be gueſſed by the eye, yet it is really very ſoft, and eaſily ſcratched.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt entirely diſſolved by it, and calcines to an opaque white or fleſh colour.

Examined by the Microſcope, it appears compoſed of parallel plates, made up of oblique ranges of regular concretions of the ſame figure with the whole, and theſe larger than thoſe of the other Species; and their arrangement and order, and the formation of the perpendicular plates reſulting thence, very fair and diſtinct.

It is found principally in the lead-mines of Yorkſhire, and ſometimes on the ſea-ſhores of that county. I have met with it on the Scarborough ſhores, finely ſtained with red, and worn into a round and pebble-like form. It has the ſame property in refraction with the Iſland Cryſtal, but is too opaque to ſhew it in any degree of perfection.

4. *Parallelopipedium durius pallide fuſcum hebes.*

Dull, hard, pale, brown Parallelopipedium.

THIS is much coarſer than moſt of the other Species. It is of a conſiderably foul and impure, yet perfectly regular and equal texture, and is not ſubject to any clouds, ſpots, or films, but is evenly throughout of the ſame degree of opacity. It is of the ſame oblique parallelopiped form with the reſt of this genus, but is always very thick in proportion to its length. It is found of various ſizes, from the ſmalneſs of a large pin's head to half an inch in length, and about a third of an inch in breadth, and is uſually equal to its length in thickneſs. It is compoſed of parallel plates on all its ſurfaces, and thoſe, notwithſtanding the ſmalneſs of the ſpecimens, are always conſiderably thick.

It is uſually of a rough ſurface all over, and covered with ridges made by the ends or edges of imperfect or broken plates. It does not eaſily ſplit with any regularity, but, when one attempts to take off a plate, uſually breaks into a multitude of ſmall regularly figured particles of its own ſhape, and all of the ſame regular ſize. It is in colour of a pale, but not diſagreeable brown, but of an opaque and duſky hue, with very little brightneſs or tranſparence.

It is conſiderably heavy, and is the hardeſt of all this Genus; it does not eaſily receive ſcratches.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt perfectly diſſolved by it.

It readily calcines to a pure white.

Examined by the Microſcope, its horizontal plates very plainly ſhew themſelves to be compoſed of oblique ranges of regular parallelopiped bodies, and are in their utmoſt diviſion much thicker than thoſe of any of the other ſpecies.

It is found in the lead-mines of Yorkſhire, and in ſome parts of Ireland; and has the ſame property of giving a double refraction with the firſt ſpecies, but has ſo little tranſparency, that it is not eaſily diſcovered unleſs in the purer and clearer pieces.

SERIES III.

CLASS III. ORDER VI. GENUS I.

ANOMORHOMBOIDIA.

PEllucid cryſtalline Spars, externally of no determinate or regular form, but breaking into regular rhomboidal maſſes: eaſily fiſſile; and compoſed of plates running both horizontally and perpendicularly through the maſſes; but cleaving more readily and evenly in an horizontal than in a perpendicular direction; their plates being ever compoſed of irregular arrangements of ſhort and thick rhomboidal concretions.

1. *Anomorhomboidium albidum lucidum fruſtuloſum.*

White, bright, and ſhattery Anomorhomboidium.

THIS is a Body in its texture and conſtitution ſomewhat approaching to the Spars of the laſt Genus, but is, while in the Earth, and in its natural ſtate, of no determinate or regular form. It is of a moderately pure and equal texture, though not very fine;

and is ſubject to white flaky flaws, and not unfrequently to ſpots and clouds of a whitiſh Earth. It is found in no regular figure, but ſometimes in rough, uneven, and miſ-ſhapen maſſes of various ſizes, from one inch to ten or more in diameter, and ſometimes in thin ſtrata, or in large perpendicular fiſſures of other ſtrata filling them up, and making fine ſtrait white veins. It is of a plated or tabulated ſtructure, its flakes running both ways, and its perpendicular as well as its horizontal ſurfaces being compoſed of flat tables, and the irregular, and as it were broken ends of tabulated maſſes. It is eaſily fiſſile, either in a perpendicular or horizontal direction; but more eaſily parts the latter way, though never into very even or thin flakes. The ſurfaces of all its plates are irregular, and variouſly ridged with the imperfect extremities of other flakes; and its plates, when ſeparate, have not the leaſt elaſticity, but eaſily ſeparate, and fall to pieces. Theſe pieces, if examined, are all found to be regularly formed Bodies, tho' of different ſizes, and are all ſhort and thick Rhomboides. Their ends are long in proportion to their breadth, and their ſides ſhort, ſo that, as they are alſo of conſiderable thickneſs, they appear ſquare on a careleſs view, and have by ſome been called Cubes, and by others not leſs improperly Parallelopipeds, ſince their oppoſite planes are by no means equal.

The whole maſs is naturally of a dead whitiſh colour; but, when freſh broken, is very remarkably bright and glittering. It is liable to various tinges, and is ſometimes found blue, green, and red, or of a faint purple, but more frequently of a fine deep brown. In this ſtate it makes a very handſome appearance, and is very gloſſy; but of whichſoever colour it is, it has but very little tranſparence. It is conſiderably heavy, but very ſoft, brittle, and ſhattery, and eaſily reduced to what ſeem its conſtituent particles, which are ſmall Rhomboides of about a thirtieth part of an inch in diameter. It is very eaſily ſcratched.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt totally diſſolved by it, and very freely calcines to a pure white.

Examined by the Microſcope, it appears compoſed of plates fiſſile to a conſiderable fineneſs; and thoſe, when ſeparated very thin, are found marked with tranſverſe and longitudinal oblique lines, interſecting one another at ſmall diſtances, and plainly cutting the whole into multitudes of theſe rhomboidal figures, into which it falls on breaking with a ſmall force. Theſe lines are indeed no other than the commiſſures of the ſeveral ranges of theſe Bodies of which the plates are compoſed; and the whole is formed exactly as the parallelopiped Spars, but with leſs regularity within, and without that determinate figure into which the regular and equal planes of thoſe Bodies throw the edges of the complete maſſes of theſe Spars.

It is found in great quantities in the lead-mines of Derbyſhire and Yorkſhire, but nowhere ſo plentifully as in Wales, where it is common to ſee perpendicular veins of a foot or two broad of it, running like ſeams all the way down the higheſt cliffs. In Derbyſhire it is commonly found in irregular maſſes of four, ſix, or eight inches in diameter; and in Yorkſhire is ſometimes ſeen on the ſhores, of the ſame ſizes, but rounded into the figure and appearance of a pebble.

2. *Anomorhomboidium lacteum opacum fruſtuloſum.*
Milk-white, opaque, ſhattery Anomorhomboidium.

THIS is a very beautiful Foſſil, tho' more opaque than moſt of the Cryſtalline Spars. It is of a tolerably fine and perfectly equal and regular texture; and though univerſally, and in all the ſpecimens, clouded with a large diffuſion of a white opaque Earth, yet is ſeldom ſeen ſpotted or ſtained either with that or any other colour in different degrees in the different parts of the maſſes.

It is of no determinate or regular external form, but is found in various ſhapes, and of very various ſizes, ſometimes in maſſes looſe and detached from all other bodies, and lodged in the ſtrata of Earth; theſe are from an inch to a foot in diameter, and uſually of very rough, irregular, and ragged ſurfaces; ſometimes it makes as it were thin ſtrata, being lodged in great quantities in the horizontal intervals of the ſtrata of ſtone: but more frequently it is found in form of perpendicular or oblique veins, running to vaſt depths thro' the ſolid ſtrata, and ſhewing itſelf like ſtreaks of ſilver in the cliffs and broken ſides of hills.

Though of no determinate external figure, it is, however, compoſed within of multitudes of variouſly ſized irregular rhomboidal maſſes. Theſe are uſually flat always plated both horizontally and perpendicularly, and very irregularly diſpoſed in the maſs, interſecting one another in angles of all degrees, and not cohering very firmly at their commiſſures, whence the ſhattery brittleneſs of the Stone; for that only breaks with eaſe into theſe maſſes, they being much harder, and not to be broken again without conſiderable force.

The ſmaller concretions are all compoſed of parallel plates, regularly and evenly laid on one another; and are eaſily, though not regularly, fiſſile into theſe plates in either direction. The plates ſeldom are to be ſeparated, either whole or ſingle; but fly off in oblique cracks, and, when urged further, always break into irregular, and ſomewhat flattiſh, rhomboidal granules. The ſurfaces of all theſe maſſes, are tolerably even, but ever marked with the imperfect edges of numbers of plates ternating in different parts of them; and theſe, when ſeparated, are not at all flexile or elaſtic. It is exactly of the colour of milk, of ſuch a pure white, and of about the ſame degree of tranſparency; but the horizontal ſurfaces of the fruſtulæ or ſmall maſſes that compoſe the whole, are, when freſh broken, of very great brightneſs, and make a very pleaſing appearance.

It is ſometimes debaſed from its white by a ſlight caſt of brown, and ſometimes by other colours, but more frequently by red than by any other: the red, however, is ſeldom a clear or fine colour, but uſually of a duſky hue; and this colour is ſometimes not diffuſed thro' the whole maſs, but lodged in broad veins.

It is moderately heavy, and conſiderably hard; but is eaſily ſcratched by Steel, and will not give fire with that metal; but ferments very violently with Aqua Fortis, and diſſolves in it, leaving only a ſmall ſediment of a pure white Earth, and very freely calcines to a ſnow-white, making, like moſt of the other Spars, a gentle crackling in the fire.

Examined by the Microſcope, its plates appear thicker than thoſe of many of the other Spars; and when procured ſingle, and examined before the double Microſcope, are ſeen to be marked all over with longitudinal and tranſverſe oblique lines, which are the commiſſures of the rhomboidal concretions, of which they are made up, and part the plates into parcels of the very ſame ſize and figure that they naturally break into.

It is found in ſome parts of France, but more plentifully in Germany, and is ſometimes ſeen in the Britiſh dominions: ſome of the cliffs on the Welſh coaſt ſhew long perpendicular veins of it; and Yorkſhire and Scotland afford it in the hills.

3. *Anomorhomboidium niveum durius hebes.*

Hard, dull, ſnow-white Anomorhomboidium.

THIS is a very elegant and beautiful Foſſil, tho' of leſs purity than many other Spars. It is of a coarſe, impure, unequal, and irregular texture, not ſubject to the ſpots or ſtains of the finer kinds, but rendered very opaque and dull, by a very large proportion of a ſnow-white Earth diffuſed all over it, but not always in the ſame proportions. It is of no determinate or regular form, but is found in looſe maſſes, lodged either in the Earthy ſtrata, or in the perpendicular fiſſures of thoſe of Stone, but never filling up thoſe fiſſures, and only forming looſe nodules of various ſizes, from two or three to eight, ten, or more inches in diameter.

Theſe are all of a rude irregular ſurface, of a duſky white on the outſide, and opaque and dull hue; but, when broken, they appear of a ſomewhat elegant, though very irregular, ſtructure, and conſiderably bright. They are compoſed partly of a very foul, though extremely white opaque Spar, and partly of a ſomewhat pellucid and very bright one. The former ſubſtance uſually makes the larger parts of the maſs, and the latter is lodged in it in form of ſpots of various ſizes, from $\frac{1}{20}$ of an inch to half an inch in diameter: ſometimes, however, this order is inverted; and the purer and brighter part makes the ſubſtance of the maſs, and the more opake and foul the ſpots. The more opake part is of a very rugged and irregular texture, but carries ſomething of an appearance of a plated ſtructure; and the finer is ever plainly tabulated, compoſed of conſiderably thick, and moderately bright and pellucid plates. When this is only the leſſer part of the maſs, and is diſpoſed in form of ſpots, thoſe are ſometimes a little rounded at their edges, but more frequently they emulate an irregularly rhomboidal form: and when this makes the matter of the maſs, it is ever fruſtuloſe, and compoſed of numbers of theſe ſmaller Moleculæ, which make the ſpots, in the other ſtate being looſe, but are here connected together, and variouſly cluſtered on one another. The ſeveral ſurfaces of theſe are all tabulated, and ridged with the terminations of broken and imperfect plates. Theſe may be ſplit off in ſmall flakes, but always break off with an oblique ſmooth edge, and break into regular rhomboidal figures.

Examined before the Microſcope, not only theſe, but the ſmaller fragments of the more foul and opaque matter, ſhew the oblique ſtriæ, ſo common in all theſe Spars; and the maſs, whichever part of it is broken, always ſeparates into rhomboidal fragments; tho' theſe more regularly ſhaped in the finer than in the more opaque part. It is every-where of a pure ſnow-white, and, in its purer parts, has a conſiderable degree of brightneſs, and ſome tranſparence.

It is very heavy, and conſiderably hard. It is not ſo eaſily ſcratched as many other ſpecies; yet will not give fire with Steel, but is diſſolved almoſt totally by Aqua Fortis, a ſmall ſediment of a white Earth only remaining.

It calcines ſlowly in the fire, but loſes nothing of its whiteneſs in the operation.

It is found in ſome parts of Derbyſhire, and is alſo common on the hills in Yorkſhire, Cumberland, and the other northern counties. It is uſually clean from foreign admixtures; but ſometimes has large oblong ſpots or ſtains, of a pale red, or a faint yellow; and has been found tinged throughout with thoſe colours, but that more rarely.

4. *Anomorhomboidium durius pellucidum cinereum.*

Hard, grey, pellucid, Anomorhomboidium.

THIS is often, by accident, a very beautiful Foſſil, being, more than any of the precedent, ſubject to the metalline tinges and reſemblance of the Gems. It is of a pure, clear, and equal texture, and of a fine cryſtalline appearance. It is, however, frequently ſubject to flaws, ſpots and clouds, and other foulneſſes. It is of no determinate external form, but is uſually found in maſſes, of the ragged figure of the common Flints, of very uneven ſurfaces, and of various ſizes, from two inches to ſix or eight in diameter, but ſeldom is ſeen larger than that.

It always carries on its ſurface ſomewhat of the obſcure appearance of a congeries of large irregularly rhomboidal maſſes, and is truly made up of ſuch; though theſe maſſes are ſo unequal in ſize, and cohere ſo firmly together, that it is not always eaſily diſcover'd on breaking: theſe moleculæ, however, may be often traced, in their out-lines, through different parts of the maſſes; and are all regularly tabulated, or compoſed of parallel plates, in all their ſurfaces. Theſe, when attempted to be ſplit off, uſually break at certain oblique veins or ſtreaks, which are the marks of the commiſſures of the ſeveral arrangements of the rhomboidal Bodies, of which they are formed, and into which they naturally ſeparate on breaking. The ſurfaces are tolerably even and ſmooth, but often marked with thin ridges by the ends of imperfect plates, which are ſeen in theſe places to be extremely fine and thin. It is naturally of a pale grey, or white, with an extremely ſmall caſt of browniſh or bluiſh in it; and is very bright and glittering, when freſh broken; and, if not examined in too large pieces, is very tranſparent. It is very frequently found alſo tinged with green, and ſometimes with red. Theſe colours are ſometimes diffuſed perfectly thro' it; but, at others, they only make veins, ſpots, and clouds, in the different parts of the maſs. Small detached pieces are alſo ſometimes found ſo beautifully tinged with yellow, as to emulate the Topaz; but it is remarkable, that this colour is never diffuſed thro' any great quantity of the Spar, but ever either tinges only ſmall looſe pieces, or forms ſmall ſpots in larger. It is very heavy, and conſiderably hard, but yet may be eaſily ſcratched.

It will not give fire with Steel, but ferments violently with Aqua Fortis, and is totally diſſolved by it.

It calcines pretty freely, with much crackling, and to a pure ſnow-white.

Examined by the Microſcope, its conſtituent plates are found to be extremely thin, and marked with oblique, tranſverſe, and longitudinal lines, which deſcribe exactly the ſhape and ſize of the Rhomboides it breaks into, and are indeed the commiſſures of thoſe Bodies, which ſeem its original concretions; no glaſſes being able to ſhew any plates or mark of other conſtituent parts in them.

It is found in the lead-mines of Yorkſhire, and is very common in Germany, and in ſome parts of Scotland. It is ſometimes found in irregular ſmall maſſes, ſeeming the broken parts of the larger; and it is principally in theſe that it is found affected by the metalline tinges, theſe being often yellow, red, or brown, and ſometimes blue or green.

5. *Anomorhomboidium fruſtuloſum pellucidum decolor.*

Pellucid, colourleſs, ſhattery Anomorhomboidium.

THIS is the moſt pellucid, and moſt approaches to Cryſtal, of any of the Bodies of this Genus. It is of a perfectly pure, fine, and regular texture, ſcarce ever ſubject to the common opaque flaky blemiſhes of the cryſtalline Bodies, but ſometimes vein'd or ſpotted with a blackiſh, and ſometimes with a browniſh, Earth.

It is of no regular figure externally, but is found in maſſes of various ſhapes and ſizes. Theſe are ever of tolerably ſmooth ſurfaces, and carry, even externally, a great deal of a cryſtalline appearance. They are found from half an inch to three, four, or five inches in diameter, and are ſometimes variouſly and irregularly angular, and ſometimes rounded into a pebble-like appearance. They are of a whitiſh, but ſomewhat opaque hue on the outſide, but when broken, they are extremely bright and gloſſy. Theſe are ever compoſed of a multitude of parallel plates, and have all their ſurfaces tabulated, and always break into large flat ſurfaces. Theſe appear extremely ſmooth and equal to a ſlight obſerver; but, nearly examined, they are ſeen to be mark'd with an infinite number of fine, thin, crooked, and variouſly undulated ſtreaks, which are plainly enough the edges of a multitude of extremely fine and thin flakes, of which the whole maſs is compoſed.

Every part of the maſs, attentively viewed, ſhews alſo a number of oblique lines, both tranſverſe and longitudinal, which may very plainly be ſeen to be the commiſſures of the various arrangements of the ſmall Bodies of which the whole is form'd, and divide it into a number of Rhomboides, by their interſecting one another.

Theſe lines are to be traced ſometimes through the whole thickneſs of the ſpecimen, and always run plainly to a great depth; and where they are loſt to the ſight, are generally recovered in a regular direction on the other ſide. The whole would ſeem, by its appearance, to be very eaſily fiſſile, its plates appearing little different from thoſe of Talc; but they are, tho' of the form of theſe, yet very little like them in ſtructure; for as the flakes of that Body are very flexile, and compoſed of ſingle and continued plates to the whole extent of the ſurface, theſe, on the contrary, are brittle in their own nature, and are much more ſo in this form, ſince compoſed not of ſingle flat plates, but of multitudes of ſmall rhomboidal Bodies, the commiſſures of which are plainly marked by fine oblique ſtreaks, interſecting each other, and marking out the ſhapes of theſe Bodies; and at theſe they always break, in the attempting to ſplit the ſtone.

A ſmall blow much more readily ſeparates it into a number of irregularly rhomboidal thick maſſes, compoſed of multitudes of theſe plates, than all the art and accuracy in the world will make it ſplit into flakes. The commiſſures of the conſtituent parts of theſe Spars are beautifully ſeen in the maſſes of this

Species, and its purity and tranſparence make it eaſy to trace them a great way into the ſubſtance: they are, however, moſt beautifully ſeen in the extremely minute diviſions of very thin plates, which have been in ſome meaſure ſeparated from the horizontal planes, if any may be properly called ſo, of this maſs, without any great violence.

It is, in the whole maſs, perfectly colourleſs, when pure, and pellucid as water, or as the pureſt cryſtal. It is of a fine brightneſs when freſh broken, its flat ſurfaces having a poliſh ſcarce inferior to that the niceſt artificer can give to cryſtal. It is conſiderably heavy, but of no great hardneſs. It is eaſily ſcratched on the ſurface.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is perfectly diſſolved by it.

It very readily calcines to a pure white.

Examined by the Microſcope, its thin plates ſhew their ſtructure extremely beautifully; and when a congeries of a conſiderable number of them are viewed together their tabulated ſtructure on all their ſurfaces, appears to be the plain conſequence of the regular figure and arrangement of the ſmall rhomboidal concretions the whole is formed of, their connections being as firm on their horizontal as on their lateral ſurfaces, and their arrangement as perfectly regular and even.

It is found in the lead-mines of Yorkſhire, but very rarely: it is alſo ſometimes ſeen in the mines of the Hartz foreſt, but is no-where a common Foſſil. It is liable to the metalline tinges, and makes a very pretty appearance when ſo ſtained. That of Germany is frequently ſtained, either partly or throughout, with green; that of our own country uſually keeps its colourleſs appearance, unleſs ſlightly tinged with brown, or ſtreaked or fouled by browniſh, bluiſh, or blackiſh Earths.

SERIES III.

Class III. Order VII. Genus I.

PLACAGNODIAUGIA.

Cruſtated Spars, conſiderably loaded with, and debaſed by Earth; Cryſtallino-terrene: imperfectly pellucid, and formed into thin plates, with flat ſurfaces, covered, at times, either in part, or intirely, with botryoide prominences of rough ſurfaces, compoſed of oblong concretions of no determinately angular figure.

The whole maſſes in the Spars of this Genus are of no regular external ſhape, being in that intirely determined by the form of the ſubſtance they are affixed to, covering various Bodies, as the edges of the fiſſures of Stone, or vegetable or other ſubſtances, in form of thinner or thicker uniform cruſts, generally rough, with theſe irregular ſmall prominences on the ſurfaces, and of an obſcurely ſtriated texture within.

Many of the columnar Spars, when ſmall, and in complex maſſes, much reſemble the Bodies of this Genus, and have been too frequently miſtaken on that account; they are, however, uſually more pure than theſe, and may at all times be diſtinguiſhed by their points, which are always regular and diſtinct, and ever of the ſame planes and angles, however complex the columns happen to be.

Dr. Woodward has, in his work, allowed a particular ſection for thoſe of the cruſted Spars in his poſſeſſion, which had tubera and effloreſcences on them: there is, however, no ſuch diſtinction in nature, all theſe Spars, being, at times, ſubject to run out into ſuch protuberances. Some of the finer incruſtations of vegetable matter in ſprings are truly alſo of this kind.

The reader will not wonder, when this is really the caſe, that I have not conſidered the place where ſuch are found, or the ſhape or nature of the ſubſtances to which they are affixed, as of any conſequence in regard to the Bodies themſelves; and therefore not left them to another claſs, that of Incruſtations, but brought them here into their proper places.

1. *Placagnodiaugium luteofuſcum ſemipellucidum durius.* *Hard, ſemipellucid, yellowiſh brown Placagnodiaugium.*

THIS is a conſiderably impure, but a very ſingular and beautiful Spar. It is, tho' not of a very fine, yet of a perfectly equal and regular texture; of the ſame degree of admixture in all its parts; and, tho' plainly ſated with a large quantity of Earth throughout, yet it has it all regularly diffuſed thro' it, and is not ſubject to ſpots, clouds, or films, or to have any part darker or more opaque than the reſt. It is of no determinate or regular external form, exactly conforming in that to the ſhape of the ſubſtance to which it is affixed, being ever found in form of a thin cruſt, equally extended over flat, round, or ever ſo irregularly ſhaped ſurfaces, nicely and exactly covering and coating them, and ſhewing the lineaments of every inequality in them; tho' ſometimes it has, beſide theſe, inequalities of its own, not at all owing to the form of the Body it is affixed to.

It is found of different thickneſſes, from a twentieth part to a third part of an inch; but is moſt frequently very thin. Its extent is by no means circumſcribed, being in every ſpecimen different, according to the ſurface of the Body it covers, from a few inches to many feet, in breadth. It is compoſed, when thin, of one ſingle plate or cruſt, of a ſomewhat rough ſurface, and obſcurely ſtriated texture; when thicker, it is made up of two, four, or more, of theſe cruſts, ſucceſſively applied and firmly joined to one another; but their commiſſures are always diſtinctly viſible, in form of ſo many thin and even black or dark brown lines. It will ſometimes readily part at theſe commiſſures; but more uſually they are as ſtrong as any other part of the maſs.

Its ſurface is, in moſt parts, tolerably even, tho' no-where at all ſmooth or gloſſy; but even, in theſe eveneſt places, it appears full of innumerable ſmall wrinkles, giving it much the appearance of the ſmoother pieces of Shagreen Leather: and in other parts it riſes, variouſly and irregularly, into ſmall, roundiſh, and flatted bubbles; but little prominent beyond the reſt of the ſurface, and of the ſame wrinkled hue with the reſt.

This is its more common appearance, and in this ſtate it makes one of the plane plates of Spar of Dr. Woodward. In other parts of the ſame plate, however, it frequently riſes into thoſe tubera and effloreſcences on the ſurface, that might give it a place in that author's following ſection. Theſe are very beautiful and often large prominences, of the ſame matter, texture, and colour with the plates, but ſomewhat rougher on their ſurfaces, and appearing on a ſlight view to be cryſtallized; but, on examining more nearly, their prominent parts are found to be of the ſame irregular figure with thoſe of the plates. Theſe are uſually either round or oblong, and, when round, are often cluſtered together in great numbers, and make a very elegant botryoide appearance. In ſome places the little round balls are perfect, and in others they ſeem half-buried in the matter of the plate. In this ſtate, however, when broken, they appear not to penetrate its ſurface, but are really only ſo many parts of balls.

The whole is of a very elegant and beautiful pale yellowiſh brown; it has but little brightneſs, but is in ſome degree tranſparent. It is moderately heavy, of but a ſmall degree of hardneſs, and eaſily ſcratched on the ſurface.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt intirely diſſolved by it, a ſmall quantity of a browniſh yellow earth only remaining.

Examined by the Microſcope, it makes a very beautiful figure. Its inner ſtructure appears but very rudely, coarſly, and irregularly ſtriated, the ſtriæ being made up of conſiderably thick parcels of the Body; theſe, however, not all regularly or evenly of the ſame thickneſs, but ſome three or four times as large as others. Theſe are alſo variouſly joined to one another, ſome ſeemingly very evenly, regularly, and firmly, and others looſly and irregularly; nor do they all run in a ſtrait regular tranſverſe order, but ſome of them are conſiderably ſlanting and oblique. The greater part of them alſo run through the whole thickneſs of each ſingle cruſt, but ſome are abrupt, and ſeem broken off in different parts, and are joined by others of the ſame, or in ſome places of different thickneſſes: and from this irregularity in the ſtructure ariſes want of hardneſs in the whole.

In ſome ſpecimens of this Body, the cruſts are ſingle, double, triple, or of more ſucceſſive orders, equally throughout. In others a ſecond or third cruſt reaches but half-way over the former, and then it does not gradually become thinner towards its edge, but breaks or terminates in its whole thickneſs, and appears as if ſome part of it had been taken off by art. The edge of ſuch a broken plate exhibits to the Microſcope the ſame ſtructure alſo, with one broken on purpoſe to be examined; and the commiſſure of the two is in theſe places often ſeen to be tolerably even and regular, and ſeems very firm.

The ſurface of this Species, which is the part by which they are always diſtinguiſhed from the complex arrangements of ſmall columnar Spars, appears to the Microſcope not of that chagreened texture that it does to the naked eye; but is plainly made up of a congeries of ſmall irregularly ſhaped prominences, which are truly the ends of the differently ſized and ſhaped oblong concretions, of which the whole is compoſed, and which give an appearance of a ſtriated ſtructure to it. Theſe ends, however are not regularly formed, angular, or pointed, as the pyramids of the columnar Spars; but are all truncated, or cut off, as it were; all terminating in blunt and variouſly oblique ends of the diameters of the ſeveral long concretions which make the ſtriæ of the Body. Theſe ends of the oblong Bodies are more prominent on the ſurfaces of the tubercles and balls, than on that of the flat plates, and make them appear more rough; but they are on theſe as irregularly ſhaped as on the plates themſelves.

It is found in many parts of England, and that in various forms. It incruſts the ſides of the perpendicular fiſſures in many places on Mendip hills, and elſewhere, in very broad flakes; and in ſome ſprings in Glouceſterſhire it is found in form of incruſtations on ſticks, and other things, that have accidentally fallen into them. There is no ſpecies of Spar that indeed appears in more various forms than this. Sometimes it makes an even cruſt over the whole bottom of a ſubterranean cavern. Sometimes it incruſts with ſeveral coats, ſmall maſſes of Spar, and makes them appear ſomewhat like Stalagmitæ; and not unfrequently it is found cementing together pieces of ſtone, ſeeming to have been before ſhattered by ſome external violence, into firm maſſes of various ſizes, and thoſe often very large. The ſubſtance and ſtructure of the Spar is the ſame in all caſes, and the whole appearance to the Microſcope no way different.

The formation of this is evidently from particles originally ſuſpended in, and accidentally ſeparated from water. Its natural configuration is owing to the quantity of oblong Bodies, which it ſeems determined to ſhoot into inſtead of more regular columns, from the large ſhare of earth it is debaſed by; and large arrangements of theſe laid ſide by ſide form its ſeveral cruſts, which ſometimes remain as they were firſt formed ſingle; ſometimes from more of the ſame matter being afterwards at ſeveral times affixed in the ſame manner to them, there are formed new and additional cruſts, and the maſſes become double, triple, or multiple, and proportionably increaſed in thickneſs.

2. *Placagnodiaugium albidum pellucidum fragile.*

Brittle, pellucid, whitiſh Placagnodiaugium.

THIS Species is in its efloreſcent and ramoſe ſtates called by different authors the Fluor Eniæformis, Fluor Strigatus, and Flos Ferri. Theſe are by no means names of peculiar Species, nor are they indeed ſo much as even peculiar to this Species, many other of the cruſted Spars riſing at times into theſe figures, though they look in none ſo beautiful as in this.

This is a very ſingular, and uſually a very beautiful Species of this ſort of Spar. It is of a tolerably pure and fine texture, but not perfectly and regularly equal in its degree of purity throughout, as moſt of this Genus are. It is in many places purer or fouler, and more or leſs pellucid, than in others. It has frequently alſo long tranſverſe ſtreaks of Earth in different parts of it, which, according to their various kinds, give it opaque ſtriæ of red, yellow, brown, or black.

It is alſo ſometimes perfectly ſated with a large quantity of ſome one of theſe coloured Earths, and becomes more foul and opaque, and throughout of that colour. It is of no determinate ſhape or ſize, but is found always in form of a thicker or thinner cruſt covering the ſides of the perpendicular fiſſures in the quarries or ſtrata of Stone. When compoſed of one cruſt only, it is uſually of about four tenths of an inch in thickneſs, and often extends to many feet in breadth. When it has received new additions in form of other additional cruſts, which is very frequently the caſe, it ſometimes is found of an inch, and ſometimes of two, three, or four inches in thickneſs, and compoſed of ſix, eight, ten, or more cruſts. It is of a rough chagreened ſurface, and, when broken, appears of a very irregularly ſtriated texture, being compoſed of numbers of oblong Bodies of various thickneſſes, but few of them very ſlender.

Its ſurface is ſometimes very even and flat for many feet together, and makes a very beautiful appearance even in that ſtate. Sometimes it riſes all over in ſmall round or half-round prominences, like ſo many puſtules, all very fairly tranſparent, and of the ſame chagreen'd ſurface with the plates; and ſometimes has large cluſters of round tuberous prominences of the like, but more rough ſurfaces, which give it a very extraordinary and beautiful appearance. Theſe are of various ſizes, but uſually about the bigneſs of a horſe-bean, all perfectly round, and hanging together in cluſters of a hundred or more, like grapes when they hang very thick in the bunch. 'Tis indeed the moſt elegant botryoide Body of all this kind; and the balls being very fairly tranſparent for a Spar of this Genus, give it a beauty beyond any of the others. Theſe, however, are not its principal beauty; for, from the thicker cruſts, it frequently ſends out ramoſe efloreſcences, divaricating into numberleſs branches, ſometimes of a ſmooth, ſometimes of a ridged ſurface, and not unaptly reſembling ſome of the larger moſſes, and ſometimes branches of fine ferns, or whole ſhrubs of heath: theſe laſt are not ſo common, but where they appear, make a very elegant figure. It is naturally of a milky hue, and moderately bright and tranſparent. It is more heavy than any other of this kind, but very ſoft, very brittle, and eaſily crumbled to pieces by a ſmall blow. It will not give fire with Steel. It ferments violently with Aqua Fortis, and is almoſt totally diſſolved by it, and freely calcines to a pure opaque white.

Examined by the Microſcope, the oblong Bodies it is compoſed of, are ſeen to be of very irregular ſizes, and but looſly connected together, ſmall longitudinal ſpaces being frequently found between them filled with Earth. Its ſurfaces are in many places, eſpecially on the efloreſcences or tuberous prominences, very full of prominent points, ſtanding out as far as the pyramids of the columnar Spars of the like ſize; but they are plainly diſtinguiſhed from them in that they are of no regular figure, but ſmall, obtuſe, and variouſly truncated.

It is found on the ſides of the perpendicular fiſſures in the mines of Germany, and ſometimes in our own in Derbyſhire, but very rarely. Some of the caverns in Mendip hills have it on their ſides and tops, but ſeldom in any great quantity, though of very great beauty.

In the fiſſures of the ſolid ſtrata, at the great mine at Goſelau in Saxony, and in the mountains in many parts of Germany, it is alſo met with, in a different, but very beautiful form; a round or roundiſh nodule, ridged in all its ſurfaces, but ſeeming compoſed of multitudes of ſmaller maſſes of flakes, lodged in different directions; and often, in the whole maſſes of this kind, repreſents very beautifully ſo many large balls of thread, wound in different rounds; the ridges of the ſmaller bundles of flakes that compoſe it, appearing like ſo many ſingle threads.

It has of late been found in this ſtate alſo in conſiderable plenty, near the Salt-mines, in the neighbourhood of Eſperie in Hungary.

SERIES III.

CLASS III. ORDER VII. GENUS II.

PLACAGNOSCIERIA.

CRyſtallino-terrene cruſtaceous Spars, of irregular ſurfaces, not of a ſtriated texture within, dull and opaque.

1. *Placagnoſcierium albido-fuſcum, durius, hebes.*

Hard, whitiſh, brown, duſky Placagnoſcierium.

THIS is of a conſiderably foul and impure texture, yet of a very regular and equal ſtructure; its debaſing Earth, which it has in very large quantity, being equally and regularly diffuſed through every part of it, and leaving no ſpots either of a purer or a coarſer texture than the reſt of the maſs. It is of no determinate figure, but, like the reſt, is extended over various bodies in form of a cruſt, ſingle, double, or multiple. It is ſometimes found of only an inch or half an inch broad, being fixed on the ſides of fiſſures of ſtone, in form of ſmall cruſts or cakes; and in other places is found of four, five, or ſix foot in extent, and is uſually multiple in the places where it ſpreads ſo wide.

When compoſed of only one cruſt, it is of about a fourteenth part of an inch in thickneſs; but it is much oftener found of half an inch thick, and compoſed of ſix or ſeven of theſe. Its plates are of a ſlightly chagreened ſurface, and the wrinkles ſmall, fine, and cloſe ſet together, the whole reſembling the fineſt and ſmootheſt of thoſe ſkins. When broken, it is ſeen to be of the ſame tranſverſly ſtriated texture with the reſt of the cruſtated Spars; but the ſtriæ appear finer and cloſer than in any other kind. Its ſurface is ſometimes plain and equal, but it is very rarely ſo; it is more frequently raiſed into ſmall protuberances, and is particular in this, that theſe are ſeldom orbicular, but uſually either oblong, or variouſly branched and divaricated, and that often in ſuch a manner as not unaptly to reſemble the ramifications of ſome of the moſſes; and theſe have often much the appearance of pieces of moſs, incruſted over with the matter of the Spar. The ſurfaces of theſe are exactly like thoſe of the plain plates finely chagreen'd; but theſe are, as is uſual in theſe Spars, more rough and pointed than the flat parts. It is of a pale browniſh white colour, and of but a dull hue, having but little brightneſs, and yet leſs tranſparence. It is conſiderably heavy, and remarkably hard.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt totally diſſolved by it.

Very freely and readily calcines to a pale white.

Examined by the Microſcope, it appears compoſed of the fineſt and moſt ſlender oblong bodies of any of this claſs; and is, like all the reſt, variouſly unequal on the ſurface from the different angles in which its conſtituent parts terminate, all of them ſeeming truncated, or cut off, but that in various directions, ſome obliquely, and ſome almoſt evenly, acroſs.

It is found very frequently on the roofs, and ſometimes covering the floors of the caverns in the Harts-foreſt in Germany; and is in ſome of our lead-mines on Mendip hills, and elſewhere, but more rarely.

2. *Placagnoſcierium albidum fragile hebes.*

Dull, crumbly, whitiſh Placagnoſcierium.

THIS is a very ſingular Species, and tho' conſiderably foul, and very opake, is not without its beauty. It is of a very impure, irregular, and ſomewhat coarſe texture, but not ſubject to ſpots or clouds, properly ſpeaking, tho' often debaſed by ſmall maſſes of looſe Earth; for theſe, tho' immerſed in it, as they are looſe in it, and not at all mixed with its ſubſtance, are not properly to be called any part of the body. It is highly ſated with a white ſeemingly marly Earth, which is equally diffuſed through it, rendering it friable and opaque, and that in ſome ſpecimens in ſo great a degree, as ſcarce to leave it a proper title to this claſs. It is of no determinate or regular figure; but is ever found in form of a ſomewhat thick cruſt, ſpread over different extents, ſometimes very great, reaching often three or four feet each way over the even ſides of fiſſures of ſtrata of ſtone. It is of various thickneſſes, as made up of one or more cruſts; when ſingle, it is uſually about an eighth part of an inch thick, and is the moſt looſe and rare of all the ſpecies: when thicker, it is made of ſeveral cruſts, which join by a looſe commiſſure, and are often naturally crack'd, and ſometimes broken into ſeveral pieces; which, being placed in different angles, leave cavities between; and theſe are uſually filled with a looſe marly Earth, ſometimes whitiſh, ſometimes reddiſh, and ſometimes browniſh. This Earth often remains in a lump, and gives a reſemblance of ſpots in the maſs; but more frequently it is found crumbled naturally into a looſe powder, and the cavities but half filled by it. The ſame matter alſo very frequently inſinuates itſelf into the commiſſures of the various plates, and makes ſometimes a very odd appearance of thin cruſts. It is of a rough or deeply chagreen'd ſurface; and, when broken, of an obſcurely and very irregularly ſtriated texture. The whole plates are ſometimes of one ſimple regularly flat ſurface throughout their whole extent, but more frequently they are covered in different parts with rough tubercles, or oblong prominences, with obtuſe and rounded ends; and ſometimes have very elegantly rarified efflореſcences in form of moſſes or ſhrubs; and theſe are always of a ſomewhat purer and more pellucid matter than the common ſubſtance of the plates.

It is naturally of a dull, dead, whitiſh colour, with little brightneſs or tranſparence. It is remarkably light, and very ſoft and crumbly.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt wholly diſſolved by it, leaving only a ſmall quantity of a whitiſh ſediment.

It very freely calcines to a pure white.

Examined by the Microſcope, it appears of a fouler and coarſer texture than the reſt of this Genus, and its plates compoſed of very irregular, but very large and thick oblong Bodies.

It ſeems plain indeed, that all theſe plated or cruſtaceous Spars are made of matter that had a tendency to form columnar Bodies, but was prevented from ſhooting into any regular ones by the great quantity of Earth they are all debaſed with. The ſurface of theſe plates and efflореſcences are plainly formed of the ends of theſe oblong Bodies, which are variouſly prominent, and variouſly truncated at their extremities.

It is found incruſting the caverns and perpendicular fiſſures of the ſolid ſtrata in ſeveral parts of Mendip hills in Somerſetſhire.

In a large cavern near Wells, I once met with a conſiderable quantity of it, ſome on the ſides, ſome on the roof, and ſome on the floor of the cavern. That on the ſides was, for the moſt part, plain and equal. That which incruſted the roof, which was not intirely covered with it, but only had it very beautifully ſticking to ſeveral parts of it, was in few places of an even ſurface; it was in many parts full of oblong Bodies hanging perpendicularly down from it, and in ſeveral others had very beautiful reſemblances of ſome of the moſſes, the ſea-plants, and even of ſmall buſhy ſhrubs hanging very elegantly from it. Theſe were of the ſame ſubſtance with the reſt, but a little whiter, and much more brittle, inſomuch that they generally fell to pieces in taking down.

5. *Placagnoſcierium friabile hebes pallide fuſcum:*
Dull, pale brown, friable, coarſe Placagnoſcierium.

THIS is the moſt common and moſt obvious of all the cruſtaceous Spars, and is contained, more or leſs, in almoſt all the Water in common uſe on the various occaſions of life. It is the moſt coarſe, impure, and earthy, of all this Genus. It is of a very lax friable ſtructure; and, tho' too dull and opaque to ſhew any ſpots or foulneſſes, is ſubject to be ſtained to various colours, by the different Earths it is blended with, or has taken up in different places. Theſe admixtures are, however, always equally diffuſed thro' it, and never alter its ſtructure or hardneſs; ſo that they never much diſguiſe or alter it in any other reſpect, but colour only. It is of no certain or determinate form or ſize: theſe it intirely owes to accident, being naturally ſuſpended in Water, and conforming its ſhape, in the ſeparated maſs, intirely to the thing it incruſts, or coats over. It is, at times, found very thick; tho' more frequently not exceeding half an inch in diameter, unleſs where its plates have been accumulated by particular accidents. When only a ſingle cruſt, it is uſually of between $\frac{1}{10}$ and $\frac{1}{5}$ of an inch thick; but when made of a ſucceſſion of cruſts, it increaſes, according to their number, in its thickneſs. It is of a tolerably plane and equal ſurface, and uſually but ſlightly chagreened, its wrinkles being never deep, and its prominences between them not ſo narrow as in moſt of theſe Species. When broken, it appears of an obſcurely and very irregularly ſtriated texture; and large interſtices may, by an accurate eye, be often diſcerned between the ſeveral oblong Bodies, which make the ſtriature of the texture. Theſe are alſo very unequal in ſize, both in regard to breadth and length, and that often in the different parts of the ſame ſpecimen. Its prominences alſo between the wrinkles of the chagreening of its ſurface, appear more diſtant and round than in moſt others. This is a natural conſequence alſo of the looſe connexion and ſpaces between the oblong Bodies that compoſe the plates, as theſe are only the ends of thoſe Bodies. Its ſurface is often regular; but, not unfrequently, is adorned with tubera and eſfloreſcences, very numerous and very elegant. Theſe are ſometimes oblong, ſometimes ramoſe; but they are moſt uſually round and botryoide, formed of numbers of ſmall globular Bodies, cohering to one another, and curiouſly chagreen'd on their ſurfaces. It is naturally of a pale whitiſh brown, with ſome faint caſt of a yellowiſhneſs in it; but is liable to all the colours that the various Earths it takes into its formation can give it. It is very opaque and dull, is moderately heavy, but very ſoft and friable, eaſily crumbling to pieces between the fingers.

It will not give fire with Steel.

It ferments violently with Aqua Fortis; but leaves a large ſediment after ſolution.

It very freely calcines to a pale fleſh-colour, or a browniſh, or a greyiſh white, according to the nature of the Earth it has taken up into it.

Examined by the Microſcope, its conſtituent oblong Bodies appear very irregular in ſhape and ſize, and very looſly put together, with large vacuities between them, and the ſame between the commiſſures of the ſeveral plates in the compound cruſts. The oblong Bodies appear uſually, as it were, duſty, and the prominences roundiſh at their ends. Frequently there are great differences in the various plates of the ſame ſpecimen; a thing that ſometimes alſo happens to ſeveral of the other Species. Theſe have, in this caſe, always the lower cruſt the moſt impure, the outer or upper the pureſt. The botryoide eſfloreſcences on this are, when thus examined, tolerably bright, and ſomewhat tranſparent, as are alſo the prominences of all the cruſts.

It is found in many places, and in very various forms: ſometimes it is extended, in form of a thin cruſt, over the fiſſures of ſtrata, ſometimes it incruſts Vegetables, and other Bodies, in ſprings and rivulets; as in two or three places in Northamptonſhire, and Glouceſterſhire; and, being univerſally almoſt ſuſpended in Water, it frequently is found incruſting the pipes of Aqueducts, and is the ſubſtance that is left on the evaporation of common Water, in form of a ſpot, at the bottom of the veſſel; and, in a more irregular ſtate, from the accidents attending its formation, incruſts our tea-kettles, and other veſſels in which Water is boiled.

SERIES III.

CLASS III. ORDER VIII. GENUS I.

CIBDELOSTRACIA.

TErrene Spars, deſtitute of all brightneſs and tranſparence, formed into thin plates, and uſually found coating over the ſides of fiſſures, and other cavities of Stone; with congeries of them of great extent; and of plain or botryoide ſurfaces.

1. *Cibdeloſtracium albido-ſubfuſcum durius.*

Hard, browniſh white Cibdeloſtracium.

THIS is one of the many Bodies here to be deſcribed, which appear ſo much of an earthy nature, as not to give a perſon, who would judge by the eye alone, any ſign of what they truly are. It is of a very coarſe, impure, and unequal texture, much reſembling an indurated Earth, or a very lax Stone; and is of no determinate figure or ſize, being found in cruſts of a vaſt extent, on the roofs and ſides of ſubterranean caverns in ſome places, and, in others, coating over Sticks, Stones, and other ſmall ſubſtances. It is ſometimes lodged on the things it covers, in a ſingle cruſt, and ſometimes in a double, triple, or quadruple one. When ſingle, it ſometimes is of $\frac{1}{3}$ of an inch in thickneſs; but very rarely exceeds that. When multiple, it is not eaſy to determine its greateſt thickneſs, ſome compound cruſts of this kind being of many inches in diameter. It is of a deeply chagreened or wrinkled ſurface; and, when broken, ſhews a perfectly irregular and very lax texture. It does not at all emulate a ſtriated texture within, nor is compoſed of any congeries of oblong Bodies, as the Spars of the former Genus are; but is of a coarſe ſtructure, and frequently very cavernous, and full of ſmaller and larger holes.

Its ſurface is always rough and wrinkled, and is ſometimes very equally ſo for a great extent, it being not uncommon to ſee many feet in extent on the ſides of fiſſures, covered with equally thick and rough plates of it. In other parts of theſe, or in other plates of the ſame ſubſtance, it riſes, however, into very elegant tubera and effloreſcences. Theſe are ſometimes roundiſh, and reſemble a large round cluſter of grapes on the bunch, when they ſtand very cloſe together; theſe being each compoſed of a great number of ſmaller round tubera, of the ſame chagreened ſurface, and opaque hue, with the reſt of the cruſt: ſome others of theſe effloreſcences are oblong, with rounded obtuſe ends, and compoſed of other ſmaller, longiſh, or roundiſh concretions, of the ſame ſubſtance with the reſt: and, beſides theſe, it is not uncommon to ſee very large and extremely elegant maſſes adjoined to, and hanging from, theſe cruſts, when on the roofs of caverns, in form of large cluſters and bundles of moſſes, or ſmall ſhrubs. Theſe are of the ſame common matter with the cruſts, but, by their figure and arrangement, look very beautiful. The whole is of a dull whitiſh hue, with a ſmall admixture of brown. It has no brightneſs, nor the leaſt tendency to tranſparence. Externally it looks like a hardened Earth; and, when broken, reſembles a ſoft and coarſe Stone.

It is moderately heavy, and conſiderably hard.

It will not give fire with Steel, nor indeed bear a blow againſt it without crumbling to pieces.

It ferments very violently with Aqua Fortis, and is almoſt totally diſſolved by it, a ſmall quantity of Earth, of a browniſh colour, only remaining.

In the fire it freely calcines to a greyiſh white.

Examined by the Microſcope, it readily diſcovers its true nature and ſtructure. It appears whitiſh, rough, and duſty on the ſurface, from a quantity of the whitiſh marly Earth that enters its compoſition, being always looſe about it in one place or other, and principally on its outer coat. This, indeed, is ſo looſely ſpread upon it as to come off in the handling, and duſt the fingers; and this duſty coat is all that is ſeen by the naked eye, and gives the whole its earthy appearance: but the Microſcope diſcovers, even on the ſurface, many lucid ſpecks, not covered with this, and appearing to be true Spar, of a pale brown colour, and of conſiderable brightneſs. Theſe lucid ſpecks are uſually the ſurfaces of ſome of the ſmall tubercles. When the maſs is full of ſuch, after a little rubbing to diſlodge the marly powder, it will ſometimes appear lucid throughout to the Microſcope; and the ramoſe and ſhrubby protuberances are particularly of this kind; they always appear a plain Marl to the eye, and very much duſt the fingers in handling; but, when that duſt is a little off, they appear abſolute branches of a bright Spar to the Microſcope.

Thus much of its texture does the Microſcope diſcover even on its ſurface; but, when broken, it appears throughout no other than a true and genuine Spar, tho' deeply ſated with Earth. It is conſiderably bright, and faintly tranſparent, and of a pale whitiſh brown, and very much reſembles the Spar of the Septa of many of the Septariæ, and ſeems compoſed of a brown Spar, very greatly ſated with a white marly Earth. It is remarkable, that this Earth, tho' always ſo plentifully looſe on the ſurface, is perfectly blended thro' the internal ſubſtance, and ſhews as little, that there is any Earth there, as the ſurface does, that there is any Spar in the maſs.

It is found coating over the tops and ſides of many of the vaſt caverns in the Harts foreſt in Germany; and ſuch cruſts of it as hang from the roofs are ſeldom without the beautiful ſhrubby effloreſcences: thoſe on the ſides are often quite plain, but ſometimes beautifully covered with the botryoide tubercles. It is alſo ſuſpended in almoſt all the waters thereabouts; and in ſeveral of the ſprings ſo coats and cruſts over the rocks, thro' which the Water comes, as almoſt to choak up the paſſage. It is found alſo in conſiderably thick cruſts on the looſe Stones in the ſame ſprings; and, incruſting ſmall Sticks, when it meets with them in its way, makes a true Oſteocolla, tho' generally in larger maſſes, and of a more irregular, tuberoſe, and knotty ſurface, than the common kind.

The Germans are ſo ſenſible that it is Oſteocolla, that they mix it with their parcels of the Oſteocolla, and ſell it as ſuch; but they religiouſly confine themſelves, however, to ſuch pieces of it as have incruſted Sticks alone for this purpoſe: and tho' the whole ſprings abound with the ſame ſubſtance, in flat cruſts, on the Stones; and the caverns where the peaſants dig the Unicornu Foſſile, are full of it, in this ſtate; yet they never meddle with theſe, or call any of it Oſteocolla, but what is in the true Oſteocolla form.

2. *Cibdeloſtracium albidum durum, cruſtis tenuioribus, ſuperficie læviori.*

Hard whitiſh Cibdeloſtracium, with thin cruſts, and a ſmoother ſurface.

THIS is a very elegant and beautiful Spar; and in whatever form it is found, whether in plain cruſts or botryoide tubera, always diſtinguiſhes itſelf by the thinneſs and ſmoothneſs of its cruſts. It is of a very dull and opaque hue, and of a coarſe, foul, and impure texture; but of a very equal and regular one, being in no part more or leſs foul and opaque than in the reſt. It carries, externally, much of the appearance of a coarſe Quarry-ſtone, of a large ſoft grit.

It is of no determinate figure or ſize; but is ſo various from itſelf, in the different ſpecimens, as not to appear at all the ſame thing to any but a judicious eye, being ſometimes found extended over the ſurfaces of Stones, in a thin equable cruſt, and at others, protruded from the ſubſtance it adheres to, in form of very large and elegant botryoide cluſters of round tubera. Its cruſts are, both in theſe tubera, and in the flat ſpecimens, uſually very numerous: when it forms only a ſingle one, it is ſeldom above one twentieth part of an inch in thickneſs; and in this ſtate it is ſometimes, tho' rarely, found coating the ſides of perpendicular fiſſures of Stone; but it is more frequent to ſee ten, or even twenty, of theſe cruſts, all of the ſame thickneſs, laid evenly on one another, and ſhewing their commiſſures, when broken tranſverſely, in fine duſky lines. This is its moſt uſual appearance; but when it riſes into tubera, theſe are not, as in the other caſes, partial efflorescences from the flat

cruſts;

cruſts; but they are in this truly the whole ſubſtance of the maſs. It is, in this caſe, formed into large cluſters, of very large roundiſh balls, of various ſizes, and variouſly running into, and cruſhing and ſpoiling the form of one another. The cluſters are from four to eighteen inches in diameter; and the tubera that compoſe them, of various ſizes, not only in different, but in the ſame maſſes, and are from the bigneſs of a nut, to that of a hen's egg.

The ſubſtance, whether examined in theſe tubera, or in the plain plates, is exactly of the ſame form and texture: the ſurface is ſmoother than that of moſt other ſpecies of this Genus; but is, however, wrinkled and chagreened in ſome degree, the wrinkles being broad, tho' not deep, and the prominences between them truly ſo many ſmall roundiſh tubera. When broken, it appears of no regular ſtructure within, nor has the leaſt ſhew of ſtriature, but reſembles a coarſe and ſoft Quarry-ſtone. It is of a pale whitiſh hue, ſometimes with a caſt of brown, and ſometimes a little faint tinge of yellowiſh or reddiſh; but theſe ever in a very faint and obſcure degree. It has not the leaſt appearance of either brightneſs or tranſparence. It is conſiderably heavy, and moderately hard.

It will not at all give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt totally diſſolved by it, leaving only an extremely ſmall quantity of an earthy ſediment.

In the fire it readily calcines to an aſh colour, or duſky grey.

Examined by the Microſcope, it as plainly as the reſt diſcovers its true nature and ſtructure, and is ſeen to be only a congeries of very beautiful, even, and regular plates, of a very bright and white Spar; leſs impure than one could have expected to find it from what the naked eye diſcovers of the maſs, and ſeeming a very fine Spar debaſed, but by a moderate quantity of a marly Earth. This earthy ſubſtance is not looſe in this Species on the ſurface, as it is in many other of theſe debaſed Spars, for which reaſon this does not duſt the fingers in handling; but there is, however, always a thin coat of it blended with a ſmaller portion of Spar, and conſequently more opaque, whiter, and more coarſe, that is extended over the ſurface, inſtead of the duſty matter of the other ſpecies: this makes it a kind of opaque coat; and, like the duſty matter of the others, being the only part viſible, it gives the whole a much coarſer look, and makes it appear more ſtony, as the looſer matter of the ſame kind does the others more earthy, by much, on its outſide, than it appears to be when broken, eſpecially when viewed by the Microſcope.

It is found, both in plain cruſts, and in tubercles, in ſeveral of the great caverns of the Harts foreſt in Germany. It not unfrequently coats over the Unicornu Foſſile found in thoſe caverns, and is uſually plain on their ſides, and botryoide on their tops or roofs. I received this ſummer a very beautiful ſpecimen, of the botryoide kind, from the great cavern at Scharzfeld, in the county of Hohnſtein, in the lower Harts foreſt, near the village of the ſame name. This cavern is of about twelve feet high, and its roof all over covered with theſe tubera, in large botryoide cluſters. Our own country is not without it. I remember to have ſeen of it near the edge of Mendip Hills, toward Wells, on the roofs of caverns; and have lately received very beautiful pieces of it from High Wickham in Buckinghamſhire.

3. *Cibdeloſtracium duriſſimum, pallide fuſcum, cruſtis tenuiſſimis numeroſis.*

Hard pale brown Cibdeloſtracium, with numerous very thin cruſts.

THIS is a beautiful ſpecies, and is remarkable for being the hardeſt of all the Terrene Spars. It is of a conſiderably impure, coarſe, and foul texture, yet very equal and regular ſtructure, and is generally of the ſame uniform colour throughout, without ſpots, ſtains, or lines of any other. It is of no determinate figure, but conforms itſelf to the ſhape of whatever ſubſtance it happens to be incruſted on, whether the ſide of a perpendicular fiſſure in Stone, in which caſe it is broad and flat; or a Stick, Bone, or other thing, that accidentally lies in its way in the ſprings, where it is ſeparated, as there are ſome ſuch; in this caſe it becomes of the ſame figure with the thing it incruſts, regularly conforming itſelf to every the ſmalleſt cavity or prominence in it, and exactly repreſenting all its lineaments.

It is in this alſo very ſingular, that when it is Wood that it incruſts, whether it be a ſmall Stick, or a fragment of a Board, or whatever, it not only regularly coats it over with ſeveral cruſts, but finally enters and inſinuates itſelf into its very pores, and makes, in the end, a kind of thorough petrefaction of the Body.

All the Oſteocollas frequently incruſt Sticks. It is, indeed, their moſt uſual manner of formation; but then they only form a cruſt, the Stick periſhing from within them, and being never penetrated by them, but leaving a cavity for the ſpace it once filled; this Species is ſingular, in that when it is found in this ſtate, it never has any cavity, but repreſents throughout the very lineaments of the grain of the Wood. It is ſometimes found in ſingle cruſts both on looſe Stones, and on the ſides of fiſſures; but is then only a fine, thin, browniſh coat upon them, of leſs than $\frac{1}{40}$ of an inch in thickneſs. This, however, ſeldom happens. It is uſually found in thick compound cruſts, made ſometimes of an hundred or more of theſe, but all regularly of the ſame thinneſs. It is of a very ſmooth ſurface, leſs ſhagreened, and with ſlighter wrinkles, than moſt others; and, when broken, ſeems of a very fine and ſolid texture, not at all ſtriated, but a little bright and glittering in ſome places.

Its ſurface, even in the planes of the greateſt extent, is uſually ſmooth and even. It has ſeldom any efflorеſcences; and when it has any, they are never of the ramoſe kind, but always round tubera, in ſmall, but botryoide cluſters. Theſe are of a ſmoother ſurface than the reſt, and, when broken, are ſeen to be compoſed of almoſt numberleſs thin cruſts. It is naturally of a fine pale brown; but is ſometimes ſtained throughout with other colours, by means of the coloured Earths it takes up at its concretion. It has more brightneſs to the naked eye than any other of the Terrene Spars, being always full of ſmall ſhining ſparks where-ever freſh broken. It has, however, no degree of tranſparence.

It is very heavy, and very remarkably hard.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt intirely diſſolved by it;

And freely calcines to a pale greyiſh white.

Examined by the Microſcope, it makes a very beautiful appearance. The cruſts are all of the ſame uniform thickneſs, and all evenly laid over one another. They are not at all of a ſtriated texture, but are rather of a tabulated Spar, being each an irregular and diſorderly congeries of ſmall complex tabulated concretions, not unlike thoſe of the Phengites Marble, and diſpoſed in the ſame irregular manner. Theſe appear to the Microſcope very bright, and moderately tranſparent. Theſe plates, or thin cruſts, join very evenly and nicely one to another, and have generally a thin line of white marking their commiſſures. The outer cruſt is always ſomewhat fouler, and more opaque, than the reſt; and ſometimes, tho' not often, is covered with a looſe duſty powder.

It is found incruſting the ſides of perpendicular fiſſures, and of ſubterranean caverns, in many parts of England. It here forms thin equable cruſts; in ſome other places it is found incruſting and penetrating the ſubſtance of Sticks, &c. but is, in both caſes, eaſily diſtinguiſhable to be the ſame ſubſtance. In the great ſubterranean caverns near Elbingrode and Rubeland in the Harts foreſt in Germany, it is very common, both in thin cruſts on the walls of the caverns, in botryoide tubera on the roofs, and lodged in the ſides, in ſome places, in the form of large pieces of branches of trees. Theſe the peaſants dig out, and ſell to the Druggiſts and Apothecaries, as one ſort of Foſſile Unicorn. Mr. Turberville Needham, ſome years ſince, found ſpecimens of it, in this very form, in England, and has given of them to moſt of his friends here.

4. *Cibdeloſtracium albiſſimum & leviſſimum friabile.*

White, light, and friable Cibdeloſtracium.

THIS is a ſpecies which, in ſome places, makes a very beautiful figure. It is of the coarſeſt and moſt debaſed texture of any of the Spars, that is, it contains more earthy Matter, and leſs Spar, than any other; and this Earth being that very light, ſpungy, and friable Marl known by the name of Lac Lunæ, it is no wonder that the whole maſs is ſo light, lax, and friable. Many ſpecimens of it are, indeed, ſo much ſo, that they will not bear touching without mouldering to pieces between the fingers. It is ever of the ſame uniform and equal texture throughout, except that it is harder in its outer cruſt than in any of the others; and this is always regularly the caſe. It is of no determinate figure, being ſometimes found in form of a ſoft and marly incruſtation, on Sticks and other ſubſtances in ſprings, and buried in the Earth among Marl, as the true Oſteocella, of which it then appears a ſofter ſpecies; but moſt frequently it is found incruſting the ſides and roofs of caverns, at great depths under-ground. It is often found in ſingle cruſts, and thoſe of very conſiderable thickneſs, ſome of them exceeding an inch. Theſe are of a ſoft marly ſtructure within, but always have a coat of a harder and more pure Sparry matter over them. Sometimes theſe cruſts are lodged three, four, or more, upon one another, and then make a coat of great thickneſs.

They are uſually of a ſlightly wrinkled ſurface, the furrows being diſtant from one another, and not deep; and, when broken, they are not at all of a ſtriated texture, but merely a looſe ſpungy maſs, of a friable matter, covered with a thin coat of ſeemingly the ſame ſort of matter, only a little purer and harder.

It is very luxuriant in efflореſcences on its ſurface, even more ſo than any other of theſe Bodies. On the ſides of caverns it is frequently full of botryoide cluſters of round tubera; and, from the cruſts of it that cover the roofs, it is very common to ſee large ramoſe efflореſcences, reſembling ſhrubs, of ſix, eight, or ten inches diameter. Theſe are uſually ſo beautifully branched, that they ſeem to have been really incruſtations on Shrubs, or buſhy Plants; tho' their place and manner of production ſhew that to be impoſſible. In other parts of the roofs there are alſo ſmaller efflореſcences of this kind, repreſenting Moſſes and Sea Plants; but theſe are more rare: the large ſhrubby ones are much the more frequent; and when the matter is of a pure white, as it very frequently is, they are extremely beautiful. It is uſually of a fine white; but ſometimes is a little browniſh or yellowiſh, and ſometimes greyiſh. It is not at all bright or tranſparent; it is very remarkably light, and extremely ſoft and crumbly.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt totally diſſolved by it.

It very freely calcines to a pure ſnow white.

Examined by the Microſcope, even in the inner part of the cruſts, where, to the naked eye, it appears a mere congeries of Marl or Earth, it there ſhews, by this means, a thouſand ſhining ſparks of Spar, of a pure white, and very bright and glittering; and appears plainly enough to be no other than a genuine Spar, which has taken up a larger than ordinary ſhare of this light white Earth.

It is found in great plenty in the caverns of the Harts foreſt in Germany, and is in ſome of thoſe of Mendip Hills; but there but rarely, and never very full of its ramoſe efflореſcences. It is not, however, peculiar to that part of our kingdom: Mr. Needham found it, with the other harder brown kind, in form of Oſteocolla, in pieces, from half an inch in diameter, to the thickneſs of a man's leg; and Mr. Henry Allnut ſent me this laſt ſummer, from High Wickham, ſome noble cluſters of its ramoſe efflореſcences.

5. *Cibdeloſtracium pallide fuſcum, durius, leve, ſuperficie læviori.*

Light, hard, pale brown Cibdeloſtracium, with a ſmooth ſurface.

THIS is a Species well known to many, tho' under an erroneous name. Its common manner of appearance is in form of a thin incruſtation, round moſs, and other ſuch ſmall Vegetables; and the leſs curious diſtinguiſhers uſually call it petrefied Moſs in this ſtate, tho' the Moſs uſually is to be found in it unaltered; or if, in tract of time, it be periſhed and gone, there is, in moſt caſes, a cavity for the place where it originally lay; and the whole proceſs of nature is nothing of the kind of petrefactions, but merely the laying a coat of this matter over the ſubſtances that lie in its way, without its ever inſinuating itſelf into their pores, or at all pervading their ſtructure.

This is but of a moderately impure texture, and is leſs fouled and debaſed with Earth than many of the other Terrene Spars. It is of a perfectly equal and uniform ſtructure, and is generally of the ſame colour and degree of mixture throughout the maſs. It is in itſelf of no determinate or regular figure, but always aſſumes that of the Body it incruſts, or forms itſelf upon, and uſually repreſents all its lineaments with a very beautiful exactneſs. Its moſt uſual appearance is in form of a thin incruſtation on various Species of the Moſſes: theſe it coats over in a moſt nice and regular manner, the Spar inſinuating itſelf into every little inequality among the ſtalks and leaves of thoſe ſmall Plants, and covering the whole with one fine cruſt, of a regular and equal thickneſs. It expreſſes the very form, and every the ſmalleſt accident, of theſe ſmall Bodies; even their little triangular leaves are exhibited perfectly by it; and being, by their additional weight, when covered with this ſubſtance, depreſſed a little from the ſtalk, they ſhew their form even more diſtinctly than in the naked Plant.

Theſe Bodies, when broken, if the incruſtation be freſh, ſhew the living, or but newly-dead, Moſs within them: if of a longer date, they are uſually hollow, the place once filled by the Moſs being now empty; and ſometimes (tho' this much more rarely) the cavity is filled up with the ſame Spar with that of the coat; tho', in this caſe, not the leaſt lineament of the inner texture of the ſubſtance once incruſted is preſerved, but a mere ſhapeleſs Spar fills the vacuity, without the leaſt ſhew of petrefaction of the ſubſtance.

This Species of Spar is not, however, confined to this appearance alone; it, like the reſt, not unfrequently incruſts caverns, both on their roofs and ſides: I have ſeen it alſo full of botryoide effloreſcences in ſome places. Its ſurface is uſually very ſmooth, even, and regular, leſs chagreened or wrinkled than that of moſt others; and, when broken, it has not the leaſt appearance of a ſtriated texture, but is a mere complex maſs of Spar, of no determinate ſtructure. It ſometimes makes ſingle, ſometimes triple, or multiple cruſts. Its ſingle cruſts are very thin and fine, often not one thirtieth part of an inch in diameter. The Moſſes are frequently incruſted with theſe ſingly; tho' ſometimes they are carried to a vaſt thickneſs, by a numerous addition on them. But, where it coats over the walls and roofs of caverns, it is uſually very thick, and often made up of near an hundred cruſts. It is of a pale brown, and has nothing of the brightneſs or tranſparence of Spar, when viewed by the naked eye only. It is remarkably light for ſo hard a Terrene Spar, and is conſiderably firm and ſtrong.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt wholly diſſolved by it.

It freely calcines in the fire to a greyiſh white.

Examined by the Microſcope, it appears a fair and bright Spar, of a very pale and even whitiſh colour, and is conſiderably bright and ſparkling, tho' very little tranſparent.

It is found in almoſt all parts of the world, and is formed every-where by ſeparation from Water or watery Vapours; for all experiments on it prove, that, when ſuſpended in Water, it is (under proper circumſtances) to be raiſed in Vapour. It is found incruſting the caverns in the Harts foreſt in Germany, and on Mendip Hills with us; and is common, in form of incruſtations on Moſs, in Glouceſterſhire and Northamptonſhire, nor leſs ſo in Ireland; but its greateſt ſtate of perfection in this kind is at the Petrefying Well at Knareſborough in Yorkſhire.

6. *Cibdeloſtracium albicans friabile, ſuperficie ſcabra.*

Whitiſh, friable, cruſtaceous Cibdeloſtracium, with a rougher ſurface.

THIS is frequently a very elegant and beautiful Species. It is of a very coarſe, foul, and impure texture; and of as earthy a hue, and almoſt as deeply ſated with Earth, as any Species of theſe Bodies; but it is always of the ſame equal and uniform ſtructure throughout, and always of the ſame colour and fabric. It is of no regular figure, but is ever found in form of an incruſtation, and is always of the ſhape of the thing it incruſts; tho' it does not expreſs all its finer lineaments, and ſmall configuration, ſo exactly as the harder and thinner cruſted Spars before deſcribed.

It is found ſometimes on ſmall Sticks, and is then accounted a kind of the Oſteocolla; ſometimes on branches of Moſs, and is then called Petrefied Moſs; ſometimes it coats over ſmall Stones, &c. in brooks, the Water of which is highly ſated with it; and ſometimes it coats over whole walls and roofs of ſubterranean caverns. Its cruſts are ſometimes ſingle, ſometimes compound: when they are lodged on Moſſes, and other ſmall Plants, they are uſually found ſingle, and of no great thickneſs; but when on the walls and roofs of caverns, a ſingle cruſt is not unfrequently of an inch in Diameter; and the compound coats with which they are lined, are often of great thickneſs, being compoſed of three, four, or many more of theſe. Its ſurface is uſually very ſcabrous and rough, deeply chagreened, and the prominences between the wrinkles high and large. When broken, it is of no ſtriated, or otherwiſe regular ſtructure; but appears a mere irregular maſs, of a very looſe and friable Stony matter. Its ſurface, on the thicker branches of the Moſſes, and other ſmall Bodies it incruſts, is often raiſed into botryoide cluſters, of ſmall round tubera; but, on the ſides and roofs of caverns, it is loaded with great cluſters of theſe; and, in many places, with very beautiful ramoſe eﬄoreſcences, as they are uſually called, of the form of Shrubs.

It is of a dull whitiſh colour; and has not, to the naked eye, the leaſt appearance of a Sparry Body, or the leaſt tendency to brightneſs or tranſparence. It is moderately heavy, but very ſoft and friable, even in the thickeſt, and ſeemingly firmeſt, of its cruſts.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is, in great part, diſſolved by it.

It freely calcines to a pure white.

It is not to be wondered at, that this, and many other of the fouleſt of the Spars of this kind, ferment with Aqua Fortis, and are many of them almoſt totally diſſolved by it, tho' made up of a great proportion of Earth with the Spar; ſince, in moſt caſes, the Earth they are debaſed by, is that kind of Marl called Lac Lunæ, which is itſelf not leſs ſoluble in Aqua Fortis, than the Spar it is mixed with.

Examined by the Microſcope, this appears, as plainly as the reſt, to be truly a Spar, tho' conſiderably debaſed by an admixture of Earth; and is, notwithſtanding that, conſiderably bright and ſparkling, of a pale and ſomewhat yellowiſh white colour, and in ſome ſmall degree tranſparent.

It is frequent in Germany and England in ſubterranean caves: we have it alſo, in the form of incruſtations, in ſome marl-pits, and in ſome brooks, in Glouceſterſhire.

7. *Cibdeloſtracium albido-fuſcum friabile, ſuperficie pulverulenta.*

Browniſh-white friable Cibdeloſtracium, with a duſty ſurface.

THIS is one of the very foul and much debaſed Terrene Spars, and carries with it much more of the appearance of a poor, lax, and crumbly Stone, than of what it really is. It is of a very coarſe and unequal texture; not of the ſame degree of purity and hardneſs throughout the maſs, but in ſome parts much more coarſe, lax, and friable, than in others; and, in ſome places, of a tolerably ſmooth ſurface; tho', in moſt, of a very looſe and duſty one, ſeeming as if continually falling and mouldering to pieces. It is of no determinate form, but is always of the ſhape of the Body it happens to concrete on. This is commonly the branches of ſome of the Moſſes; and theſe it ſometimes covers ſo regularly, as to ſhew their lineaments in ſome degree; tho' it generally forms only a coarſe irregular maſs, by the incruſting a large bundle of them at a time. It is compoſed ſometimes of ſingle cruſts, but more frequently of ſeveral, very rudely laid over one another, with very looſe and open commiſſures, and eaſily ſeparating from one another, or crumbling to pieces together.

Theſe cruſts, when broken, are found to be of no regular ſtructure, but mere maſſes of a ſhapeleſs matter, laid on, in irregular coats, on the Bodies it incruſts. The ſurface, in the greater part of the maſſes, is looſe, and covered, as it were, with a groſs powder. In ſuch places as this powder does not lie on, it is ever tolerably ſmooth and even, never riſing into the tubera or eﬄoreſcences ſo common in the other Terrene Spars.

It is of a pale whitiſh brown colour, without the leaſt appearance of brightneſs to the naked eye, much leſs of tranſparence. It is conſiderably heavy, but very ſoft and friable, readily crumbling to pieces on handling.

It will not give fire with Steel.

It ferments very briſkly with Aqua Fortis; but leaves a large remainder, of a browniſh Earth, after ſolution.

In the fire, it freely calcines to a pale grey, ſometimes with a faint admixture of fleſh colour.

Examined by the Microſcope, it appears ſo extremely different from its figure to the naked eye, that it is not eaſy for one to be brought to believe it the ſame object. Inſtead of that very opake, dull, and coarſe maſs, the naked eye would determine it to be, it here appears a beautiful, bright, and partly pellucid Spar. Its plain ſurfaces are thus diſcovered to be, in ſome degree, chagreened and wrinkled; and its duſty ones are only covered with ſmall irregular particles of the ſame kind.

It is found in ſeveral parts of Ireland, on the borders of ſprings, and about the bottoms of rocks. It is ſometimes very remarkably tinged, on its outſide, with a fine ſky-blue in ſome parts, and, in others, with a paler blue, with a faint bluſh of purple on it: ſome alſo I have met with, coated, in the ſame manner, with a faint obſcure green. Theſe colours are always merely ſuperficial, never at all penetrating the ſubſtance. The Microſcope ſhews, in theſe ſpecimens, that the external cryſtallizations of the Spar are tinged throughout with theſe beautiful colours; but that they only are affected by them, the next under them being ever of their own natural colour. Theſe colours are unqueſtionably owing to copper. I have received ſpecimens of this coloured kind from ſome caverns in the mountain of Blackenberg, in the Harts foreſt in Germany; and ſince from Mr. Simon, of Dublin, who had met with them in Ireland.

SERIES III.

ORDER VIII. GENUS II.

CIBDELOPLACIA.

TErrene Spars, deſtitute of all brightneſs or tranſparence; formed into plates, and uſually found coating over Vegetables and other extraneous Bodies, in form of Incruſtations.

1. *Cibdeloplacium albido-cinereum friabile, ſuperficie tuberoſa.*
Greyiſh white friable Cibdeloplacium, with a tuberous ſurface.

THIS is a very ſingular Species of theſe Bodies, and ever keeps moſt ſtrictly and regularly to its form and manner of conſtruction. It is of a conſiderably coarſe, foul, and impure texture, and ſeems highly ſated with Earth. It is ever of the ſame uniform ſtructure, and degree of foulneſs, thro' the whole maſs; and is not ſo perfectly indeterminate and irregular in form, as the others of this kind of Bodies; for it ever forms itſelf into long and ſlender cylindric Bodies. Sometimes theſe have a Stick, a Straw, or ſome other ſuch Body, within them, round which they ſeem to have concreted, in form of regular incruſtations; but very often they have nothing of this, nor the leaſt appearance that there ever was ſuch a Body within; the cavity being perfectly empty, and ſeeming ever to have been ſo. The cylindric Bodies are of various ſizes, from the bigneſs of a ſmall pin, to an inch in diameter, and four, five, or ſix inches in length; but their uſual ſtandard is about the length and thickneſs of the barrel of a a common gooſe-quill.

Theſe approach not a little to the figure of the Oſteocolla, and are truly a kind of it, being of nearly the ſame ſubſtance with what is acknowledged as ſuch by the moſt accurate judges, and received into uſe in the ſhops. Theſe cylindrical Bodies are not found ſingle, but ever concreted together into looſe bundles, which are of various ſizes, from two or three inches in diameter, to the bigneſs of a man's head. The pipes, if they may be ſo called, cohere firmly to one another, and are placed irregularly, and in various directions. They have no ſubſtance of any kind in their interſtices between, but have them perfectly vacant, hollow, and empty.

It is of a very remarkably rough ſurface, full of roundiſh protuberances, ſome ſingle, others in ſmall cluſters, and is more properly of a botryoide, than of a chagreened ſurface. When broken, theſe pipes are ſeen to be of no regular texture, but are always compoſed of a harder, brighter, and purer internal part, covered by this botryoide cruſt, which is conſiderably thick, and of a much more dull, opake, and coarſe ſtructure, being plainly very highly ſated with Earth. The ſingle protuberances on the ſurface are ſeldom larger than the head of a large pin; and the cluſters of them are a ſort of diminutives of the botryoide cluſters of the tubera on the other kinds, few of theſe exceeding in the whole the ſize of a large pea. Theſe cruſts are never ſingle, nor ever more than double; the inner one being always of a cloſe, firm, compact texture, of a whitiſh hue, and ſomewhat bright; the outer more looſe, friable, and dull, more ſated with Earth, and of a pale aſh-coloured grey.

It has not the leaſt external appearance of brightneſs or tranſparence, and is but moderately heavy, and may eaſily be broken between the fingers; tho' not ſo very looſe or duſty as ſome of the other kinds.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is, in great part, diſſolved by it.

It calcines very freely to a greyiſh white.

Examined by the Microſcope, it makes a very beautiful appearance: the tubera on the ſurface are ſo many ſingle or complex effloreſcences, of a Spar highly loaded with Earth, yet ſhewing itſelf very plainly, not only in many lucid ſparks, but in the whole Body of the matter. Within this is the harder cruſt, which is very bright, and conſiderably tranſparent, and ſeems but a ſlightly debaſed, pale, yellowiſh white Spar. Within this, moſt frequently, is only an empty cavity; but ſometimes I have been able to trace the remains of vegetable fibres there; and ſometimes (tho' that more rarely) the remaining bark of a Stick may be ſeen very plainly.

There is no doubt but that, while this was in concreting, it very frequently met with Sticks, Straws, and other ſuch Bodies, round which it affixed, and formed itſelf; but where there were none ſuch, it has not altered its form, but ever affected an oblong tubular ſhape; as is alſo the caſe of the two or three following Species, and may, without any great difficulty, be conceived to be, naturally enough, the form of a quick concretion, of a natural, flat, cruſtaceous Body, in a fluid, in a ſtate of motion; nothing being more eaſy to conceive, than that, if the matter at firſt ſubſided in a flat cruſt on the ſurface of the bottom, it might, while ſoft, be eaſily rolled up into this form, by a running-water; or that, near a place where the Water of a ſpring meets with any reſiſtance, and forms little eddies or dimpled circles of ſmall diameters, it muſt naturally throw a ſolid ſubſtance, ſeparated from it while in ſuch motion, into this very figure of a hollow cylindric Body, of the diameter of one of thoſe little eddies; and it is a well-known fact, that theſe places, where there are theſe reſiſtances in the current of brooks and ſprings, whoſe Waters are loaded with Spar, are the very places where theſe Bodies are moſt frequently formed, that is, where the Spar is the moſt readily and eaſily ſeparated from this Water.

It is found in England, Ireland, Germany, and many other parts of the world; ſometimes in ſprings, and ſometimes in the marl-pits, buried in the ſtrata of Marl at various depths.

2. *Cibdeloplacium albido-fuſcum, friabile, læve.*

Smooth, friable, whitiſh-brown Cibdeloplacium.

THIS is a Species ſomething analogous to the former, in the formation of its tubulæ, but extremely different in their ſubſtance, order, and diſpoſition. It is of a very impure, coarſe, and foul texture, having the appearance of a hard and dry marly Earth, not at all of a Spar. It is naturally and regularly of an oblong tubular form; and ever throws itſelf in part, thro' ſeldom wholly, into long cylindric pipes. Theſe are ſometimes formed by incruſtation round vegetable Bodies; but more frequently ſeem to have owed their form merely to the motion of the fluid they were formed in, and to have had no ſubſtance whatever for their baſis to concrete round. The pipes it forms are of various dimenſions: they are ſeldom ſmaller or ſhorter, however, than the barrel of a crow-quill, or ſeldom exceed the length and thickneſs of one's finger. They are ſometimes compoſed of ſingle cruſts, but more frequently of two, three, or four, ſometimes of more; but each ſo thin, that the complex ſeldom exceeds the twelfth part of an inch in thickneſs. Theſe are ſometimes, tho' rarely, found looſe and ſingle; but more frequently they are collected, many together, into a bundle: they do not, however, in this caſe, cohere to one another, but are ſurrounded every way, and, as it were, immerſed in a coarſe irregular maſs, of the ſame ſubſtance of which they are formed, but of no figure, but merely reſembling a very lax friable Stone, or dry harſh Marl, being always looſe, friable, ſpungy, and duſty. The pipes are lodged in this in all directions; ſome tranſverſly, ſome longitudinally, and others in various angles with theſe; and ſeem plainly to have been themſelves firſt formed and hardened, and to have had the looſe and irregular maſs collected and lodged about them afterwards.

They are of a tolerably ſmooth and equal ſurface; not at all gloſſy or polite indeed, nor wholly free from wrinkles, but more ſlightly chagreened than the generality of theſe Bodies, and very little ſubject to the tubera and effloreſcences ſo common on them. When broken, they appear not at all ſtriated, or of any other regular ſtructure; but very looſe and ſpungy in the ſubſtance of the cruſts; and are very irregularly joined, nay indeed, with commiſſures very full of holes and cavities in many places. It is of a browniſh-white in colour, and of a very coarſe and perfectly dull hue. It is very remarkably light and friable.

It will not give fire with Steel.

It ferments very violently with Aqua Fortis.

It calcines freely to a duſky bluiſh white.

Examined by the Microſcope, it appears extremely ſated with Earth, very foul and coarſe, and of a looſe, ſpungy, and cavernous ſtructure. The Spar, however, ſhews itſelf every-where too plainly to be miſtaken for any other ſubſtance; and is, in many parts of the pipes, very bright and ſparkling; in all, even the coarſeſt, it appears to have the true gloſs of Spar, tho' much dulled by the opake Earth it is mixed with.

It is found in the Marl-pits of Derbyſhire in many places, and is not uncommon in the Petrefying Springs, as they are called, in Northamptonſhire; but there the pipes are uſually ſmall and thin, often conſiſting of only one cruſt, rarely of more than two.

3. *Cibdeloplacium craſſius, ex albo pallide fuſcum, durum, ſuperficie ſcabrâ.*
Oſteocolla authorum & officinarum.

Hard, pale-brown, thick, rough Cibdeloplacium.
The Oſteocolla of the Shops.

THIS is a ſubſtance well known in the German ſhops, and in ſome of the Engliſh, though with us it is rarely uſed. Authors who have treated of it have not been very accurate in their deſcriptions of it; for ſome of them have deſcribed one, and ſome another, of the cruſtaceous terrene Spars under this name; and others, who had more carefully looked into nature, make three or four kinds of it.

It is certain, that every one of the tubular cylindric terrene Spars are properly Species of the ſame Genus with this; and many of them are in different places accounted true Oſteocolla. They all probably indeed poſſeſs alſo the ſame virtues; but the thick, hard, and rough Species here to be deſcribed, is the kind moſt univerſally received as Oſteocolla, and accounted in the German ſhops the true genuine Species.

It is no wonder indeed that various Bodies of this Kind ſhould be received under its name, ſince there are few deſcriptions of it accurate enough to determine the very Species; and not only all the cylindric and tubular, but even the cruſtaceous terrene Spars, almoſt all of them are, at one time or other, found emulating its form.

It is of a very coarſe, foul, and impure texture; and carries with it much more of the appearance of an indurated Marl, or looſe ſoft Stone, than of a Sparry Body.

It is ever of the ſame determinate and regular form, being always found in long and thick irregularly cylindrical pieces, uſually hollow, but ſometimes filled up with a ſofter marly ſubſtance, and very often containing within them the remains of a Stick, or ſome other like Body, round which it had originally concreted and formed itſelf. Experience makes it impoſſible to queſtion but that ſome ſpecimens of the Oſteocolla have really been formed by incruſtations round vegetable Bodies; but we are not hence to conclude, that there is no Oſteocolla but what has been ſo formed, ſince there are many ſpecimens of it, nay, moſt are ſuch, that not only have no ſuch remains, but that from their form never can have had any ſuch matter within them, being not regularly tubular, but merely in the form of a flat Body rolled into a round one while ſoft, ſome having their ſides beat in and preſſed to the oppoſite ones, and others, tho' compoſed of ſeveral cruſts, yet not having each of them in form of a regular circle round the inner cavity, as muſt have been the caſe, had they been formed by incruſtation; but ſhewing plainly, that they were once ſo many thin ſtrata together, compoſing a flat ſurface, which has been ſince rolled up, as one might do a paper three or four times doubled, in two, three, or more ſpiral lines; in which caſe each ſingle edge of the paper would be every-where a regular part of a continued ſpiral line drawn from a given point; but they would by no means be ſo many detached concentric circles.

This is exactly the caſe in ſome of the ſpecimens of Oſteocolla; the lines made by the edges or commiſſures of the cruſts being regular parts of a ſpiral line, but by no means ſo many ſeparate concentric circles, as they muſt have been, had they been formed by regular and ſeparate incruſtations round any extraneous Body. A cloſe obſervation and examination of one of theſe ſpecimens will convince any one, that the Body, though now rolled into a cylindric form, muſt have once been a flat plate or cake: and this not only explains the formation of this Species in many caſes, but gives great light into that of the other cylindric tubular Spars.

This, tho' ever conſtantly of the ſame, or very nearly the ſame form, is, however, of very different ſizes, ſome pieces of it being found not exceeding the diameter of a crow-quill, others up to the thickneſs of a luſty man's arm; the moſt frequent ſize is, however, about the thickneſs of a finger, and ſomething leſs than a finger's-length.

It is found ſometimes compoſed of one ſingle cruſt only, ſometimes of ſeveral, but moſt frequently of only two, each of the ſame colour and ſtructure, and each covered on both ſides by a thin duſty white coat, ſo that there is a white line for the commiſſure between them.

It is always of a rough, deeply wrinkled, and irregular ſurface, covered with prominent knobs of various ſizes: theſe, however, are merely protuberances of the matter that forms the whole; not additional tubera, and cryſtallized effloreſcences, as they are in moſt of the other Species. Theſe, and indeed the whole outer ſurface, are covered with a thin coat of a greyiſh-white duſty matter, and give the whole the appearance of a Body of that colour: when broken, however, it is ſeen to be of a pale-brown, and harder and purer ſubſtance, but of no ſtriated or otherwiſe regularly conſtructed ſubſtance.

It has neither on the ſurface, nor when broken, any brightneſs, when viewed by the naked eye.

It is conſiderably heavy, and very hard.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt totally diſſolved by it.

It freely calcines to a greyiſh white.

Examined by the Microſcope, it is ſeen to be a true and genuine Spar, though very conſiderably debaſed by Earth. Its white duſty coat appears very lax and ſpungy, and much of a marly or earthy ſtructure, but with, here and there, ſome ſparks of Spar interſperſed; but its true internal ſubſtance is ſeen to be a fine, compact and hard, pale-brown Spar, conſiderably bright and gloſſy, but not much tranſparent, as being very conſiderably debaſed by Earth: the earthy matter is, however, ſo equally and perfectly mixed with it, as to make a ſubſtance very analogous to the mixture of Cryſtal with Earth into an even, compact, and bright Flint.

It is found in many parts of the German dominions, and in ſome other places. It is ſometimes found buried in looſe marly Earths, ſometimes in the ſtrata of Sand, and lies from two to ten feet deep. There are alſo two or three brooks in the Harts foreſt, one near Gruningen, and another not far from Rotelberode, in which it is continually formed. It is from theſe Waters that the ſpecimens which are found incruſted on

Sticks, &c. are uſually taken, though it is not one in ten of thoſe here that have theſe Sticks, or any other extraneous Bodies, within them; but have really been formed as thoſe of the other tubular cylindric Bodies of this kind; by the mere motion of this Water alone, at the time they ſeparated themſelves from it.

Sileſia and Bohemia afford the Oſteocolla in great abundance, nor is it wanting in France, Italy, and England. Its uſual colour throughout the world is that we commonly ſee it in with us, a pale-whitiſh one; but, like the other Sparry Bodies, it is ſubject to changes in it from the admixture of other Earths at the time of its concretion. Thus in ſome parts of Germany they find it yellowiſh, and coarſe, and heavy, from an accidental admixture of a yellow clay, the whole form, conſtitution, and ſtructure of the Body remaining otherwiſe the ſame: and in France it is not unfrequently found ſomewhat debaſed by a blue clay, like that of our tile-pits. In theſe caſes ſometimes the earthy matter it accidentally takes up is mixed throughout with the ſparry, but oftener the inner cruſts are of their true and natural texture and ſubſtance, and the adventitious Earth is only received into the outer, which is always more earthy than the inner, and in this caſe becomes often very hard, harſh, and coarſe, and, till examined by the Microſcope, carries not the leaſt mark of Spar.

It has been long in great eſteem in the world as a medicine, but the preſent practice in England neglects it, though in Germany it is ſtill much uſed, and, as I am credibly informed, with great ſucceſs.

Inquiring alſo among the few in England who have ever try'd it, I received from Mr. Hamilton, ſurgeon, an account of his having twice known it of great and ſignal ſervice, when nature could not perform her office of producing a Callus in a broken bone without it. This has always been eſteemed its great virtue. The Germans univerſally allow it of great uſe in caſes of fractured bones for the quickly bringing on a Callus; but if given too largely, and that to young robuſt people, they find it apt to breed too much of it, and the limb, though very well ſet, to be afterwards uſually deformed. It is alſo eſteemed a remedy in that troubleſome diſeaſe, the Fluor Albus; and is ſaid to be good in intermittent fevers.

4. *Cibdeloplacium albido-ſubcinereum, friabile, ſuperficie lævi.*
Quæ Unicornu foſſile, Ceratites, & Lithomarga alba authorum.

Whitiſh-grey, friable Cibdeloplacium, with a ſmooth ſurface.
The foſſile Unicorn, Ceratites, and white Stone Marl of authors.

THIS is a ſubſtance hitherto in general much miſunderſtood, and is properly no other than a Body of this Genus, principally differing from the Oſteocolla in its ſoftneſs, and the ſmoothneſs of its ſurface; but from its having, like many other of the terrene Spars, the quality of incruſting and ſometimes permeating the pores of Bodies, and in a manner petrefying them, it has obtained the names of the things it thus lodges itſelf in and about; which being uſually bone, and ſome of them bones of a remarkable ſize, and ſomewhat extraordinary figure, were miſtaken for Unicorns horns, and the name and nature of the Body itſelf wholly neglected and loſt, and that of the horn, with that of its imaginary animal, only preſerved.

They are, however, ſenſible in Germany that it is not the horn, but this ſubſtance which pervades it, that is of the uſe in medicine, though they do not honour it with a name; for they never uſe the foſſile bones which they find in their natural ſtate, or petrified in the common way, but only ſuch as are impregnated with this Sparry ſubſtance, and even uſe all things that are impregnated with this, and that under the ſame name, calling the natural tubules of it, and even ſticks, and pieces of branches of trees, impregnated with it, Foſſile Unicorn, but allowing plain or petrefied bones no ſuch name: ſo that from the bones, erroneouſly ſuppoſed thoſe of Unicorns, being found frequently impregnated with this terrene Spar, the name UnicornuFoſſile, firſt applied to theſe bones ſo altered, is now become a mere technical term, and ſignifies no more than ſome Body impregnated with this ſubſtance, or concretions of this ſubſtance alone.

The Spar itſelf, in its natural ſtate, is perfectly of the ſame general form, matter, and ſtructure, with the reſt of the terrene Spars. It is of a very coarſe, impure, and irregular ſtructure, being a Spar highly ſated with a whitiſh marly Earth, but that in different degrees, not only in the different ſpecimens, but very frequently in the different parts of the ſame ſpecimen, it being accordingly harder in ſome places, and more lax, ſoft, and friable in others; in ſome ſpecimens being nearly, as hard as the Oſteocolla, though in moſt greatly ſofter, and ſomewhat porous and ſpungy. It is naturally, and where it has concreted without coming in the way of any other Body, of a determinate and regular form, being ever an oblong and moderately thick cylindric tubular Body, frequently narrower at one end than the other, and ſomewhat approaching to a conic form, and ſometimes is found with its inner cavity empty, the oftener that is filled with the ſame ſubſtances with thoſe that compoſe the Body itſelf, only mixed in a different degree, the Marl being here in much the greater proportion, and the Spar in the mixture ſcarce enough indeed to hold the whole together.

It is extremely various in ſize, ſome ſpecimens of it being found of leſs than an inch in length, and others of two or three feet, and of ſix, eight, or ten inches in diameter. It is found of all the dimenſions between theſe, but its moſt frequent ſize is about five inches long, and two inches in diameter, and with the cavity not empty, but filled with the marly matter before deſcribed, with ſcarce Spar enough among it to keep it in a maſs.

It is ever, even in the ſmalleſt ſpecimens, compoſed of ſeveral cruſts; thoſe of the common ſize are uſually made up of ten, twelve, or more. Theſe are not, as in many of the other tubular terrene Spars, the inner the finer and more ſparry, and the outer the coarſer and more earthy; but they are all regularly of the ſame ſtructure and compoſition in the ſame part of the maſs: and though one end of a ſpecimen is often very coarſe, and another tolerably fine; yet all the cruſts of each of thoſe ends are ever of the ſame degree of purity and fineneſs. It is extremely different from the Oſteocolla, and indeed from all the reſt of theſe tubular Spars, in that it has a very ſmooth, even, and plain ſurface, never chagreen'd or wrinkled, nor ever riſing into tubera, or other protuberances.

It is naturally of a whitiſh-grey, but, like the Oſteocolla, and other of the Bodies of this kind, is ſubject to ſome variations in its colour, from the taking up different Earths in its concretion. Its varieties of this kind are much the ſame with thoſe of the Oſteocolla alſo in the Earths that occaſion them, and are uſually either from a yellowiſh or a bluiſh clay. It has no ſort of brightneſs, or tendency to tranſparence, but appears rather an indurated Marl, than a Sparry Body.

It is moderately light, and commonly ſomewhat ſoft and friable. There are inſtances of its being ſoft as mere Marl, but none of its arriving at a greater degree of hardneſs than that of the Oſteocolla.

The peaſants indeed ſometimes would obtrude the *Fluor terrena cruſtaceaduriſſima pallide-fuſca cruſtis tenuiſſimis numeroſis*, before deſcribed, on the Apothecaries for this; but they are wiſe enough to know the difference, though ſome authors, in their accounts of the Foſſile Unicorn, as they have learnt from the peaſants to call this Body, have deſcribed that Species as a kind of it.

It will not give fire with Steel.

It ferments very briſkly with Aqua Fortis, and is almoſt totally diſſolved by it.

It freely calcines to a duſky-greyiſh white.

Examined by the Microſcope, it appears much more bright and ſparkling than could be conceived from its appearance to the naked eye; and is evidently ſeen to be a pale yellowiſh Spar, debaſed by a large admixture of a whitiſh Marl.

This is the genuine ſtructure and natural appearance of this Foſſil: tho' it be its natural appearance, it is, however, far from being its moſt frequent one; for this ſubſtance very ſeldom concretes ſeparate, but either coats over and fills up the pores of other Bodies, or, which is yet more common, pervades and fills up their pores without coating them over, and ſo makes the appearance of a ſort of petrefied wood, bone, tooth, or other ſubſtance.

It is found in form of different bones, ſome of very great ſize, as thoſe of Elephants, and ribs, teeth, thigh-bones, vertebræ, jaw-bones, &c. are all at times found ſated with it; as alſo, parts of branches of trees, and ſticks of various ſizes; all theſe the peaſants collect, and ſell to the Apothecaries of Germany under the name of Foſſile Unicorn. The ſeeing that many of theſe Bodies were originally bones, and the imagining its own natural concretions, which are cylindric or conic, to have been ſo too, gave birth probably to the error of thinking them the bones of Unicorns, ſince thoſe conical Bodies, when large, as of two or three foot long, ſtrait, hollow within, and tapering all the way toward a point, could be taken by ſuch judges for no other bones or animal productions, but the horns of Unicorns, and there was not the leaſt idea of their being the natural figure of the Foſſil. Nature, however, has not been ſingular in giving this form to this Body, ſince the long hollow nucleus of the *Septaria nucleo oblonge cavo,* deſcribed in its proper place, is of the ſame ſhape, and in like manner hollow, or filled with a different ſubſtance.

It is found in different parts of the world, and particularly in Germany, though nowhere there ſo plentifully as in the cavern of Scharzfeld in the Harts foreſt. The peaſants have been uſed of a long time to ſupply the ſhops from this cavern, and do ſo ſtill, though not ſo eaſily, being forced to dig for it; whereas, before they had ſo well clear'd it away, it uſed to ſtick out every-where in large maſſes from the ſides of the cavern.

It is in great eſteem in Germany, as a ſudorific and aſtringent; and the whiteſt, ſofteſt, and moſt friable, is eſteemed the beſt. It is given in fevers, attended with diarrhœas, with great ſucceſs; and is uſed externally in eye-waters, and in puſtulary eruptions.

5. *Cibdeloplacium albido-fuſcum coralloides tuberoſum & inæquale.*

Whitiſh-brown, tuberoſe, unequal coralloide Cibdeloplacium.

THIS is a Species very ſingular for its weight, hardneſs, and ſolidity; and tho' ſometimes hollow, it is not ſo much as one ſpecimen in a hundred that is ſo: it has a good deal of the external form of Oſteocolla in ſome of its leſs tuberoſe and branched ſpecimens, and is called in this ſtate, by the Germans, Erd-mangen or Earth-man.

Our great Dr. Woodward having never found any criterions for the diſtinctions of Foſſils, or cloſey examined their real ſtructure, was much at a loſs where to range this, as it ſeems to have appeared to him an anomalous Foſſil, and has placed it among the cruſtated ferrugineous Bodies, though neither ferrugineous, nor cruſtated, nor indeed at all allied to that claſs. He is, however, leſs pardonable in having ſuited his deſcription of it to the place he allots it, given us its roundiſh form, which is ſeldom met with as its common appearance, and deſcribed it as hollow, to make it anſwer the character of the Bodies in that place, though nothing is more obvious, than that it is very rarely ſo.

It is of a moderately fine texture; and though not pure enough to carry the marks of what it is obviouſly to the eye, or appear at firſt ſight a Sparry Body, yet is more pure, or leſs debaſed by Earth, than moſt other of the Terrene Spars.

It is of a ſomewhat determinate and regular form, though not without ſome variation; its uſual ſhape being that of a ſmall oblong cylindric Body, ſometimes of a tolerably even and plain ſurface, but more frequently branched out into ſmall ramifications, and beſet with ſhort, irregular, and often crooked protuberances all over, and in this form very much reſembling ſome of the coarſer white foſſile Corals. This laſt is its common appearance; but it not only varies into the plain cylindric Bodies before deſcribed, both with and without branches, but ſometimes is found in a roundiſh or oval form, of the bigneſs of a nutmeg, ſometimes larger, and ſometimes ſmaller; and in this caſe is uſually hollow within, free from protuberances, and contains a little Earth, or dry looſe powder. In its more common coralliform ſtate, it is uſually of about two Inches and a half in length, and a third of an inch or leſs in diameter. It ſeldom much exceeds this, and but few ſpecimens are found much ſmaller, unleſs accidentally broken. It is of a ſomewhat lightly chagreen'd or wrinkled ſurface, and uſually is, all over its maſſes, full of little depreſſed cavities, or irregular pores, which give it yet more the appearance of the coralloide Bodies. When broken, it is uſually found to be firm, ſolid, and compact, of a ſomewhat paler brown than on the outſide, where it is debaſed by a ſmall admixture of the clay it ſeems to have concreted among, and of a ſmooth and even ſtructure, ſomewhat approaching in appearance to the coarſer pieces of Flint: nor is it at all to be wondered at, that it ſhould be ſo, ſince it is a Body formed of Earth and Spar, juſt as the Flints are of Earth and Cryſtal. It is, properly ſpeaking, compoſed only of one maſs of matter not of different cruſts, though the clay that has a little way inſinuated itſelf into its exterior part, while yet moiſt and ſoft, gives that part of it ſo debaſed ſomewhat of the appearance of a coarſe cruſt.

It is of a pale whitiſh brown colour, of a very dull, duſky, and earthy hue, on its outſide, and is conſiderably hard and heavy.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, but leaves a conſiderable quantity of a brown argillaceous Earth after its ſolution.

It freely calcines to a greyiſh white.

Examined by the Microſcope, it appears a very fair and conſiderably pure Spar, of a pale whitiſh colour, very bright, and moderately tranſparent. It is, however, of a remarkably ſpungy and cavernous ſtructure, and commonly has its holes filled with ſmall maſſes of an argillaceous Earth. It is no wonder therefore, that it leaves ſo large a portion of Earth after ſolution. The Earth in its compoſition is plainly of a clayey kind, and thence is the hardneſs of the whole ſubſtance, ſince, if ſo ſhattery and brittle a ſubſtance as pure Spar is, be debaſed by a large admixture of ſo lax and friable an Earth as Marls are, it is no wonder the compound muſt be alſo very brittle; but if debaſed by a tough, viſcid, and tenacious Clay, it muſt naturally be ſuppoſed that it will be much ſtronger and harder.

It is found lodged in the ſtrata of yellow Clay in many parts of the world. It is very common in France and in Germany, nor is almoſt any part of England wholly without it. The place where it is found in the greateſt abundance I have ever ſeen is in the brick-clay, where the clay-pits are dug near the end of Gray's-Inn-lane, London, about a quarter of a mile from the end of the lane, and a ſtone's-throw on the right-hand ſide of the public road. We have ſpecimens of it plentifully enough thrown up from our common clay-pits in general to the north of London, but here a cart might be loaded with what is thrown up in one ſeaſon.

It lies in the Clay in all directions, and from three to ten feet deep.

SERIES III.

CLASS III. ORDER IX. GENUS I.

STALACTAGNIA.

CALLED

STALACTITÆ, or STONY ICICLES.

Cryſtalline Spars, formed into oblong conical Bodies, compoſed of various cruſts, and uſually found hanging in form of Icicles from the roofs of grottos, &c.

1. *Stalactagnium album duriſſimum.*
Hard, white Stalactagnium.

THIS is a very elegant and beautiful Body. It is of an extremely pure, fine, equal, and regular texture; and ſeems perfectly free from all admixtures of Earth, or any other foreign matter, and compoſed of as pure a cryſtalline Spar as nature affords us in any form.

It is very little ſubject to any flaws, or other blemiſhes, and approaches to the luſtre of Cryſtal, but wants a great deal of its tranſparence.

It is a tolerably regular Body; and, tho' not always of the ſame form, but varying according to the accidents attending its formation, yet under the ſame circumſtances it ever makes much the ſame appearance. Its regular figure is that of an Icicle, and oblong Body, broadeſt at the baſis, and tapering toward the point, ſo as to be of a conic figure in the whole. Its natural place and manner of accretion is the hanging by its baſis, from the top or arch'd roof of ſome ſubterranean cavern; and when found in this poſition, it is ever of this determinate figure. It is, however, very different in ſize; and, when nicely examined, ſomething irregular in ſhape, though always conic and pointed from the baſis.

It is of all ſizes from an inch in length, to eight, ten, or fifteen inches. There are indeed even much larger than theſe; and it is not eaſy to ſet bounds to nature in its ſize, when there is time and ſpace for its formation. It is ever of a ſmooth, even, and polite ſurface, very bright and gloſſy, as if wrought by the hand of the ableſt workman, and much reſembling a fine poliſhed piece of ſtatuary Marble. It is ſometimes perfectly ſmooth all the way down its ſurface, but oftener has ſmall protuberant rings, as it were, or prominent circles, ſtanding pretty cloſe to one another all the way along it: theſe are ſometimes regularly circular, and ſometimes waved, bending, and uneven. The whole Body is alſo ſometimes very perfectly round, ſometimes conſiderably flatted, and at others has long prominences in one or more parts of it, bulging out ſo far as to make it form an irregular round Body. Its point is ſometimes very obtuſe, but oftener very ſmall and ſlender.

This is the external appearance of this elegant Body; but, when broken, it ſhews a not leſs beautiful ſtructure: it is then ſeen to be compoſed of a vaſt number of thin and elegant cruſts, all of a ſeemingly ſtriated texture, cloſely and evenly ſurrounding one another, and all formed round a ſmall and long cavity, which is ſometimes placed exactly in the centre of the Body, but oftener near one ſide, and is uſually found perfectly empty, tho' ſometimes filled up with the ſame pure Spar that forms the reſt of the Body.

The ſtriated texture of this is perfectly analogous to that of the ſeveral compound and ſimple cruſtaceous Spars before deſcribed, and is owing, as in them, to theſe cruſts being all compoſed of arrangements of irregularly ſhaped oblong Bodies, which ſeem the primary concretions of the Spar of which the whole is formed. The ſize as well as the ſituation of the cavity, in theſe Bodies, is irregular and uncertain; ſometimes it will ſcarce admit a crow-quill, ſometimes one may thruſt a large finger into it. The cruſts which ſurround it are alſo of no certain or determinate number, and are ſometimes much thicker, that is, compoſed of longer Bodies in ſome one part of the cruſt than in another; and that, when once begun, is ever carried on regularly thro' the whole Body.

This is the moſt perfect and natural figure of this Foſſil; but the ſame matter, inſtead of this regular formation, in its hanging from the top of the grotto, ſometimes is found concreted on the bottom, and ſometimes all over the ſides of the caverns. In the firſt of theſe caſes, it is formed by the ſeparation of Spar of this purity from Water dropping down to the floor from the roof of the cavern, with the Spar yet in it, as it is on the roof, from the ſeparation of it from the ſame Water before it drops down, and on the ſides, from the trickling down of Water continually all over them, and the ſame Spar deſerting it, and ſeparating from it in its paſſage.

The Spar therefore, in all theſe caſes, is the ſame, and the body form'd of it the ſame, only in different ſhape, from the different accidents of its formation; and in moſt caverns where it is found in one, it is alſo found in all theſe ſtates: on the bottom it naturally forms Bodies ſomewhat of the form of the icicles hanging from the top, only broader, thicker, and more obtuſely pointed; and on the ſides it concretes into cruſts of various thickneſſes, and adorned with various prominent maſſes, according to the quantity and courſe of the Water; but all differing from the tubera and botryoide cluſters of the ordinary cruſtaceous Spars, in their ſubſtance, and the extreme politeneſs and gloſs of their ſurface, all appearing like figures of the pureſt white ſtatuary Marble, finiſhed by the fineſt workman. From the endleſs variety of theſe prominences on the walls of caverns, and from the conjunction of numbers of the upright Bodies on the floors, in various combinations and numbers, from the accidental courſe and dropping of water, figures very various and beautiful are continually formed in deep caverns, where there is plenty of Water, plenty of Spar in the Water, and great length of time, and an undiſturbed ſtate of formation of them: and theſe combinations and accidental protuberances are what coat over the famous grottoes of the iſlands in the Archipelago, and the caverns in the Harts foreſt in Germany, where people of fertile imaginations have formed them to themſelves as repreſenting groves, rivers, trees, plants, buildings, and the forms of various animals.

This is the true hiſtory of thoſe ſtrange figures travellers deſcribe to us in theſe caverns, and theſe the various and elegant appearances of this, the ſame Species of Spar; for, in whatever form it appears, its ſubſtance and internal ſtructure are ever the the ſame; it is ever of the ſame polite and gloſſy ſurface, and ever has the ſame characters. It is of a very elegant white, of great brightneſs, and, when broken into ſmall pieces, is very fairly tranſparent.

It is conſiderably heavy, and very hard; but, when urged by a violent blow, always ſeparates into ſmall congeries of thoſe oblong Bodies that form its cruſts, and are probably its original concretions, and theſe uſually whole, the maſſes being of the ſame diameter with that of the cruſt they were ſeparated from.

It will not give fire with Steel.

It ferments very violently with Aqua Fortis, and is intirely diſſolved by it.

It freely calcines to a pure white.

Examined by the Microſcope, it appears compoſed, in each cruſt, of oblong, but irregularly ſhaped, Bodies, all angular, but not at all determinately or regularly ſo, and all of a very elegant degree of brightneſs and tranſparence.

It is found in vaſt plenty in all the caverns of the Harts foreſt in Germany; nor leſs in thoſe of the iſlands of the Archipelago; nor are we abſolutely without it in England; but with us it is more ſcarce. Some of the caverns in Mendip-hills have ſomething of it, as alſo thoſe in ſome parts of Derbyſhire. In the famous grotto of Antiparos people have fanſied it forms trees, rivers, plants, animals, &c. and in the famous ſubterranean cavern in the Harts foreſt, called *Baumous Cave*, it has, by the people who have viſited that place, been formed into lions, dogs, horſes, and other animals; nay, into human faces, adorned with feſtoons of flowers, fruits, fretwork, and a thouſand other various figures: among the reſt an organ, with all the pipes, as they fanſy, perfect and proportionate, and a monk in his habit, with his crown ſhaved, and two attendants at his ſide. Theſe figures are all merely imaginary, as much as many of a like kind in our own country, and are the work of the fancy of the obſerver; nay, many of them ſo little expreſs the thing they once did, when they received their names, from the continual addition of new matter, and that ſometimes alſo from new ſources, that the obſerver, unleſs aſſiſted by his guide, may very eaſily form very different figures from them, and miſtake the organ for a foreſt, or the monk for a lion.

2. *Stalactagnium Cryſtallinum albidum fruſtuloſum.*

White ſhattery Stalactagnium.

THIS is a very elegant and beautiful Body, and, like all the reſt of the Stalactical Spars, ſometimes forms protuberances on the floors of grottoes, ſometimes incruſtations on their ſides, but, more frequently and naturally, Stony icicles from their tops.

It is of a very pure, fine, and equal texture; and is a Spar very little debaſed by Earth, and ſeldom ſubject to flaws, foulneſs, or other blemiſhes. Its moſt perfect and natural form is that of the Stalactites, in which it hangs from the roofs of caverns in a long, roundiſh, and conic Body, with a broad baſis, by which it is affixed to the Stone of the roof, and a blunt roundiſh apex at the other end.

It is very various in ſize, being found from two inches to twenty in length; but its moſt frequent ſtandard is about four inches in length, and three quarters of an inch in diameter. It is ſometimes of a plane, ſometimes of an unequal, ſurface, with a number of prominent rings, of from one twentieth to one tenth part of an inch broad, ſurrounding it in ſeveral parts; and is ſometimes pretty regularly rounded, but oftener ſomewhat flattiſh, or ridged, with an oblong prominence from ſome one ſide. It is ever of a perfectly polite ſurface, very bright and ſhining, and reſembling the beſt poliſh our workmen give to Marble. When broken, it has uſually an open cavity at or near its centre; tho' this is ſometimes far removed to one ſide, and not unfrequently is filled up and obliterated. It may always be known, however, where this was placed, as it is ever the axis of the Body; and the whole is formed of various cruſts, ſurrounding this. Theſe are uncertain in number and in thickneſs; but are ever of an irregularly ſtriated texture, and compoſed of the oblong concretions which ſeem the primary ones of theſe Spars; but theſe are ſhorter and thicker than in the former Species. The maſs generally breaks with an irregular ſurface; and the various angles theſe concretions make, give, by the brightneſs of their ſurfaces, a very remarkably glittering look to the whole.

It is of a whitiſh colour, ſometimes with a faint admixture of a yellowiſhneſs, but oftener with ſomewhat of a bluiſh-grey caſt; and is of great brightneſs both without and within, but not much tranſparence. It is moderately heavy, but very friable, brittle, and ſhattery, falling to pieces with a ſmall blow, and generally ſeparating into ſmall, oblong, but thick, Bodies, variouſly and irregularly angular, which ſeem its primary concretions, and are the Bodies from arrangements of which its cruſts are formed.

It will not give fire with Steel.

It very briſkly ferments with Aqua Fortis.

It calcines to a pure white.

Examined by the Microſcope, its primary concretions (if truly ſo) are plainly diſtinguiſhable, and are ſeen to cohere but ſlightly and irregularly at their commiſſures; and thence is probably the ſhattery conſtruction of the whole Body.

It is found in great plenty in many of the caverns in the Harts foreſt and other parts of Germany, and we have it not unfrequently in England: the caverns in Derbyſhire, and many of thoſe in Glouceſterſhire, and on Mendip-hills, have it in conſiderable plenty. In thoſe about the laſt place I have obſerved it in various forms, on the walls and bottom, as well as hanging from the roofs, but not coating over the whole ſides, as the finer kind uſually does, but only in ſeparate blotches. It is here alſo ſometimes tinged with a fine red.

3. *Stalactagnium Cryſtallinum flavum fruſtuloſum.*

Yellow ſhattery cryſtalline Stalactagnium.

THIS is much of the ſame external form, and of about the ſame degree of hardneſs, with the ordinary white Stalactites. It is of a conſiderably pure and fine texture, and of an extremely even and regular ſtructure. It has the appearance of a conſiderably pure Spar; and, when freſh broken, looks not much unlike the Phengites Marble, but that it is a little purer than that. It is ſeldom affected by ſpots, flaws, or any other blemiſhes, and is uſually of the ſame regular and uniform degree of colour throughout. It is naturally of a long and pointed form, and is thicker, in proportion to its length, than any of the other kinds. It is of various ſizes, from two to twelve inches in length; and has no common ſtandard between thoſe, being as frequently found of one of the intermediate lengths as of another. It is of a very polite and gloſſy ſurface, and terminates in a moderately ſharp point.

When broken, it appears very fruſtuloſe or ſhattery in its texture, its conſtituent particles being larger, and more looſly connected, than in any of the other kinds. It has, however, ſomewhat of a ſtriated appearance, and is compoſed of many cruſts, forming concentric circles one within another. Theſe, however, are each of a conſiderable thickneſs; and the primary concretions of the maſs, of the arrangements of which they are compoſed, are all very thick and ſhort. It is of an agreeable pale-yellow colour, but uſually with ſome admixture of browniſh; and is very bright, and faintly tranſparent. It is conſiderably heavy, but very ſoft, friable, and ſhattery, eaſily ſeparating into its primary concretions on a ſmall blow.

It will not give fire with Steel.

It ferments violently with Aqua Fortis.

It eaſily calcines to a pure white, or ſometimes to a pale fleſh-colour. This laſt is the caſe when it is yellower than ordinary, and has actually a quantity of an ocherous Earth in it.

Examined by the Microſcope, it appears compoſed of many very ſlightly connected circular cruſts. Its cavity, which is ſometimes in the centre, ſometimes on one ſide, is, when empty, tolerably ſmooth and even within; but it is more frequently filled up with a ſomewhat paler Spar, of the ſame kind with the reſt; and the Bodies, which are arranged into theſe cruſts, are all much of the ſame figure, and ſhorter, in proportion to their thickneſs, than in any of the reſt. They are angular, but not at all regularly ſo; and are but ſlightly joined to one another, like the cruſts they form.

It is found hanging from the roofs of mines, and ſubterranean caverns; and is ſometimes, like the reſt, found on their floors, and incruſting their ſides. It is common in the German caves, and in the mines of Yorkſhire, Devonſhire, and Derbyſhire. In Germany it is ſometimes found ſo looſe and lax in texture, as to make a cavernous maſs, almoſt as ſpungy as a Pumice.

SERIES III.

CLASS III. ORDER IX. GENUS II.

STALACTOCIBDELA.

CRyſtolino-terrene, and Terrene Spars, formed into oblong Bodies, and found hanging from the roofs of grottoes, &c.

1. *Stalactocibdelum ſubfuſcum friabile.*

Browniſh friable Stalactocibdelum.

THIS is a very common Spar, and the Stalactitæ formed of it frequent enough; and tho' not of all the brightneſs or beauty of the more cryſtalline Kinds, yet they are often a very regular and elegant Foſſil. It is of a moderately pure and leſs debaſed texture than moſt of the Terrene Spars; and contains not ſo great a portion of Earth as wholly to efface its Sparry look. It is of a regular figure, when formed into a Stalactites, being ever very long and ſlender, very hollow, or formed round a large central cavity, and compoſed of very numerous and very thin cruſts.

It is affixed to the roof of the arch or cavern it hangs from, by a baſis very narrow in proportion to its length; and is thence extended perpendicularly a great way, and terminates in a ſharp point. It is of various ſizes, from an inch in length to two or three feet; but it requires a perfectly ſtill place to ſuffer it to acquire that length, being naturally very brittle, as well as very thin in its cruſts, and liable, when extended to that length, to be broke by the leaſt guſt of wind.

It is of a ſomewhat rough ſcabrous ſurface; and that not chagreened or wrinkled, as in the cruſtaceous Terrene Spars; but its inequalities are made of the edges of imperfect cruſts, ſtanding out from the common ſurface. It is but in few places that it wants theſe; and where it does, is there not ſo ſmooth and polite as the more cryſtalline kinds; but has very numerous, tho' very minute, protuberances, with obtuſe ends, ſtanding very thick together. Theſe, however, on the ſmaller ſpecimens, are ſo minute, and withal ſo flat, that the ſurface ſometimes appears, on a careleſs view, to be ſmooth and even.

When broken, it is found to be compoſed of very numerous thin cruſts, ſurrounding a large cavity, uſually of more than ten times their diameter. Theſe are but irregularly placed together, and frequently do not touch, but have conſiderable cavities between them. They are all of an obſcurely ſtriated texture; and have their ſurfaces, when not contiguous, beſet with ſmall protuberances, as is alſo the inner ſurface of the central cavity. This is the common and moſt natural appearance of this Spar; but it is ſometimes found like the reſt, in thin cruſts on the ſides of caverns, and in larger and thicker upright Bodies riſing from their bottoms.

It is ever of an extremely pale brown colour, unleſs greatly debaſed by a duſky Earth, as is ſometimes the caſe, when it is not only of a deeper colour, but much more foul and opake: it has otherwiſe ſome little ſhare of brightneſs, where freſh broken, and ſome faint degree of tranſparence. It is extremely light and friable, eaſily breaking with the ſmalleſt violence.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt totally diſſolved by it.

It freely calcines to a pure white.

Examined by the Microſcope, the cruſts appear very badly joined to one another; and are themſelves alſo of a lax texture, being made up of arrangements of ſhort and flat Bodies, of irregular ſurfaces, and laid not at all evenly or regularly together. The protuberances on the inſide and on the outſide, as alſo thoſe in the interſtices between the cruſts, are of a tuberous figure, ſomewhat rounded at their ends, and of a ſlightly chagreened ſurface.

It is common in the caverns of Mendip-hills, and is not unfrequently found hanging down from Stone arches, and thoſe ſuch as have not been long built: even the arches of our new bridge over the Thames at Weſtminſter, tho' that building is hardly yet finiſhed, are already hung with ſmall ones; and the artificial caſcade in Lord Burlington's gardens at Chiſwick abounds with them, under the large Stones. This gives a demonſtration of theſe Bodies being continually formed to this day; as does the following Species a yet more eminent one.

2. *Stalactocibdelum niveum friabile.*

Snow-white friable Stalactocibdelum.

THIS is a very ſingular and very elegant Body. It is of a conſiderably debaſed texture, containing as great a proportion of Earth with its Spar as any Species; but that of ſo perfect a whiteneſs, as to add beauty, rather than take any away, by its admixture. It is of a ſomewhat irregular texture, ſome parts of it being much more debaſed by Earth than others; but it is every-where, to the naked eye, of the ſame ſnow-white colour, and has not been hitherto known to be ever tinged to any other colours. It is uſually found in form of a regular and perfect Stalactites, of a very ſingular ſtructure, being ever extremely long and ſlender, when not diſturbed in its formation, and ſuffered to acquire its natural dimenſions. It is affixed to the roof of the place where it is formed by a ſmall or narrow baſis, and thence not unfrequently hangs down to the length of three, four, or five feet, its thickeſt part not being of more than three quarters of inch diameter. Tho' there are ſome that exceed this, yet it ſeems their natural proportion to be thus thin, and more are found thus than otherwiſe. It is found of all lengths, from this to an inch, or leſs; and is perfect, and regularly formed, even in the ſmalleſt.

It is of an unequal ſurface, frequently riſing into large prominences, ſometimes running circularly round the whole Body, ſometimes only bulging out from one part of it, and generally terminates in a tolerably acute point. It is externally of a very fairly polite and gloſſy ſurface; and, when broken, appears compoſed of almoſt innumerable thin cruſts, reſembling nothing ſo much as ſo many rolls of a fine, thin, white paper. It is very uncertain and irregular in regard to its central cavity: ſometimes it has none; and that it has, at others, when open, is uſually but ſmall; and ſtands ſometimes in the centre, ſometimes much on one ſide. Its ſeveral cruſts are extremely thin, and by no means regularly joined together: they uſually touch in ſome few places; but in the reſt have large cavities between, and theſe very irregular, the ſeveral cruſts ſeldom making ſo many regular concentric circles, but ſo many undulated and variouſly arched ones, and having large cavities between the arched part of the outer, and the ſurface of the inner, cruſt. Theſe Sinuſes are ſometimes empty, ſometimes filled up with a more debaſed Sparry matter than that of the cruſts; but more frequently they are in part empty, and, for the greater ſpace, filled up with ſmall oblong tubera, from the inner ſurface of the outer cruſt, whoſe undulations and archings form them.

It is externally of a ſomewhat milky hue; and, when broken, is of a perfect ſnow-white within; but ſhews nothing of the cryſtalline brightneſs of the purer Spars to the naked eye, nor has the leaſt tendency to tranſparence, but rather appears a very pure and fine kind of Chalk, than any other ſubſtance. It is moderately light, and very ſoft and friable.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is totally diſſolved by it.

It very freely and eaſily calcines to a pure white, but ſomewhat duſkier than its own natural colour.

Examined by the Microſcope, it makes a very elegant appearance. It there no longer appears under the diſguiſe of an Earth, but is ſeen to be a true Spar, tho' debaſed by Earthy matter. Its cruſts are ſeen to be of a ſomewhat milky hue, moderately bright, and in ſome degree tranſparent, and ſomething reſembling the outer ſurface, as it appears to the naked eye; but not ſmooth and polite as that, but raiſed into ſmall obtuſe tubera all over, and each full of little oblong concretions on its inſide. When theſe touch one another, they cohere very firmly; but that is ſeldom the caſe; for they are uſually unequal, and full of the cavities before deſcribed. Theſe are often filled up, either intirely or in part, by a fine ſnow-white ſubſtance, of the ſame kind with the cruſts, only more debaſed by Earth; yet the Earth very perfectly mixed, and the whole made up of ſmall congeries of yet ſmaller concretions of the Spar thus debaſed; and the whole, when viewed in a proper light, conſiderably bright and ſparkling. This frequently makes a ſort of cruſts between the others, filling up the irregular vacuities they leave; and when this is not the caſe, the inner ſurfaces of the arched cruſts generally throw out ſmall oblong protuberances, as pure and colourleſs as the fineſt cryſtal, which in part fill up the cavity.

It is found in caverns, and hanging down from the arched roofs of old mines, all over the Harts foreſt; but no-where was it ever more plentifully produced than in the arched brick vault, which ſupports part of the terras at Windſor caſtle. The workmen, having occaſion to go into this ſome little time ago, found the whole vault in a manner filled up with Bodies of this Species; ſome hanging down for many feet in length from the roof, others ſtanding erect on the floor, and others coating the ſide walls. The firſt of theſe were formed of Spar deſerting the Water, in which it had been ſuſpended before it fell from the roof; the ſecond of Spar falling from the roof to the floor without leaving its Water, but there deſerting it; and the laſt, many of which were of various and beautiful forms, and in ſome degree reſembled the fanſied delineations of the German grottoes, were plainly formed of the ſame Spar, ſeparating itſelf from the Water as it trickled down the ſides.

The preſent formation of Stalactitæ is, by this inſtance, certainly proved beyond all doubt; but theſe filling a brick vault may poſſibly ſeem a thing not eaſy to be accounted for. Thoſe formed on the arches of Stone bridges may ſeem not ſo wonderful, as they may naturally enough be ſuppoſed to be drained out of the Stone of the building, by Water pervading it: but theſe which could not have been lodged in Bricks, appear much more difficult to be accounted for: their colour, indeed, might make them ſuſpected of being waſhed out from the Morter that had cemented the Bricks; but we find a microſcopical examination of them ſhews they are compoſed of matter not to be found in Morter. They hang alſo more from the ſubſtance of the Bricks themſelves than of the Morter in the place; and this one quantity of them (tho' I doubt not but the vault will be continually ſupplied with others) was nearly as much as that of all the Morter employed in building it; yet that Morter no way impaired or leſſened in quantity.

The whole myſtery of their formation may, however, be accounted for, if we conſider, that, according to the experiments before delivered, Spar, and that not only pure, but when greatly debaſed by Earth, is capable of being raiſed with Water in vapours. That it continually is thus raiſed in the Earth, is unqueſtionable; and ſuch vapour, ſo loaded with Spar, aſcending up, and at length concreted into drops by the cloſe arch of this vault, as in rooms lined with Marble, has hung and gathered into larger drops, partly on the roof, and partly on the ſides of the vault. Theſe, now become Waters, eaſily deſerted the Spar they had before brought up in form of vapour, and became again abſorbed by the Earth without it, leaving it in its natural form, on the roof, walls, and bottom of the cavern.

And this, I doubt not, is alſo the true origin of the Stalactitæ in other natural caverns; the vapours, which are condenſed into Water in thoſe places, being all ſated with Spar; and the Water, which hangs in drops on the roofs, and is continually falling, being ſo full of that ſubſtance, and now, in form of Water, ſo ready to part with it, that I remember, in one of the caverns on Mendip hills, when I was ſome years ſince there, the drops of clear Water that fell from the roof of the cavern on my cloaths, when they dried, always left each a large white ſpot behind them, which might be afterwards rubbed off from them in form of a white duſt, of a chalky hue, and was really the powder of the terrene, cruſtaceous, and ſtalactical Spar, that in a more compact form lined the walls and roof of the caverns.

SERIES III.

CLASS III. ORDER X. GENUS I.

STALAGMODIAUGIA.

SPars found in form of ſmall balls, each compoſed of numerous cruſts, pellucid and cryſtalline. The Bodies of this and the following Genus are called by authors Stalagmitæ.

1. *Stalagmodiaugium albicans, cruſtis tenuioribus numeroſis, ſuperficie lævi.*

White Stalagmodiaugium, with thin numerous cruſts, and a ſmooth ſurface.

THIS is a very elegant and beautiful Body, and is not a common Spar in a round form, but is truly and diſtinctly a peculiar Species; and never, ſo far as I have been able to obſerve, is found in any other. It is of a conſiderably pure and fine texture, and of an extremely regular and equal ſurface, being of equal purity and brightneſs in all its parts. It is of a regular and determinate figure, being ever found in form of a perfectly round ball. Theſe are ſometimes found ſingle, and ſometimes in cluſters, ten, twelve, or more of them being ſtuck together; but they never adhere to any other Body. They are indeed found, at times, incloſed in maſſes of the ſame Sparry matter, as it might ſeem, or buried in irregularly ſhaped Sparry Stones, their ſurfaces only being ſeen ſtanding out in ſome few places, in form of tubera; and ſometimes wholly immerſed in maſſes of that kind, and not appearing till the maſs be broken.

Theſe varieties of appearance have been the occaſion of ſome miſtakes about the origin of theſe Bodies. This matter ſurrounding them is, however, no part of their ſubſtance, nor has any thing to do with their formation; but is merely accidental, additional, and adventitious. The natural and perfect form of the Body is a ſingle round ball. If a number of theſe balls happen to be brought together while moiſt, and not perfectly concreted; and that either by their being rolled together into the ſame place by the Water they are formed in, or by their firſt concretions being placed ſo near one another on the floor of a grotto, that in coming to their due ſize they muſt come together and touch; in either of theſe caſes the balls cohere firmly together, and make a botryoide maſs. If there happens no more Spar to be added to this maſs, it remains in this ſtate; but if more, and that of a coarſer kind, be from time to time added to it, it by degrees fills up, either wholly or in part, the cavities left between the balls; and ſometimes ſo covers the whole formerly botryoide cluſter, that nothing is to be ſeen but a rude Sparry Stone.

This is, however, eaſily diſcovered to have been the true origin of the maſs, if it be broken; for the balls, or Stalagmitæ, will be found to have cohered firmly together, and the coarſer matter that covers them to have been adventitious, and brought on afterwards. Each of theſe balls is of a perfectly ſmooth and polite ſurface, equal to that of Marble poliſhed by the ableſt hand. When broken, they are found to be compoſed of a vaſt number of cruſts, all of the ſame thickneſs, all neatly and exactly cohering together, each cloſely covering that next under it, and all of a very finely ſtriated texture. Theſe cruſts are ſometimes carried to ſuch a minuteneſs in the centre, that one can diſcern no nucleus even by the beſt glaſſes; at other times a ſmall Sparry nodule, of a coarſer kind, may be ſeen, as the nucleus; and in others there is a large central cavity, lined with fine oblong ſhoots of a very pure and cryſtalline Spar, as if the Body had begun its formation on a large drop of Water, which had ſince evaporated. It is of a pure white colour, conſiderably bright, and, in thin pieces, moderately tranſparent. It is conſiderably heavy, and moderately hard.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is totally diſſolved by it.

It freely calcines to a pure ſnow-white.

Examined by the Microſcope, its cruſts are ſeen to be perfectly evenly laid on one another, and to be compoſed of regular arrangements of perfectly ſtrait, and very beautifully, tho' not regularly, angular, oblong Bodies, probably the primary concretions of the matter it is formed of.

It is found in ſome of the caverns in the Harts foreſt, and in ſome other places of the like kind. It is ever found either looſe and ſingle in the bottoms of ſprings, or cluſtered in the ſmall eddies they make in ſome places, or elſe affixed in ſingle balls, or botryoide maſſes, to the floors of the caverns. In the firſt caſe it is always perfectly round; in the latter it is flatted at the part where it adheres to the floor.

In the famous cavern called the Baumans Cave, in the Harts foreſt in Germany, there is a well of extremely clear Water, in which plenty of theſe are formed ſingle, and ſome few in cluſters. Theſe are all perfectly round. On the floor of the ſame cave, in many places, there are alſo great numbers of them; but thoſe are flatted on one ſide, where they adhere, or have adhered, to the Stone. There are alſo in ſome parts of this cavern vaſt quantities of botryoide protuberances of other cruſtaceous Spars, which at times fall off, and, lying looſe on the floor, ſomewhat reſemble theſe Stalagmitæ. A cloſe obſervation will always diſcover their difference, however; and it is to be remarked, that the true Stalagmitæ in general are rare; and theſe botryoide or ſingle tubera of the common cruſtaceous Spars, fallen from the ſides and roofs of the caverns, are what are generally miſtaken for them; ſo that there are in reality much fewer true Stalagmitæ in the cabinets of the curious, than is commonly imagined.

The well juſt now mentioned, in the Baumans Cave, is famous for giving relief in the ſtone; and various people in the neighbouring places affirm, that they have known abſolute cures from it. I cannot but obſerve by the way, on this occaſion, that Spar has ever been famous in all its ſtates, and that, without its being at all known to be Spar in its ſeveral forms, for the cure of nephritic complaints; the plain Spars are given in White-wine with ſucceſs for it, in Derbyſhire, and all the other counties of England that produce them. The tabulated Spars in the Eaſt-Indies, the ſame with ours, are, and have ever been, uſed by the natives in the ſame caſes. The Lapis Judaicus has ever been famous for the ſame purpoſes, as have alſo the Septa of the Ludus Helmontii; and, finally, this Water, ſo full of Spar; while the people who uſed them have little thought, that theſe different ſubſtances were really all at the bottom the ſame thing, or that the Water of this well was the very ſame in a fluid ſtate, and probably the very beſt way of taking it. The uſe of ſo many different kinds of Spar in the ſame intention for ſo many ages, and that in ſo many parts of the world, and among people who could not have learnt the uſe of it from one another, muſt ſurely prove, that its good effects alone can have recommended and continued its uſe; a ſubject worthy the inquiry of the Phyſicians of the preſent age.

2. *Stalagmodiaugium albido-ſubcinereum, cruſtis craſſiuſculis, ſuperficie ſcabra.*

Greyiſh-white Stalagmodiaugium, with thicker cruſts, and a rough ſurface.

THIS is a very beautiful Body, tho' leſs pure, and leſs regular, in its form and ſtructure, than the former Species. It is of a moderately pure and fine texture, but ſlightly debaſed by Earth; and of a tolerably regular ſtructure, tho' with ſome little variations from itſelf in ſome inſtances. It is naturally of an orbicular form; but ſometimes degenerates into an oval, oblong, or flat one; but is a peculiar and diſtinct Species of Spar, and is never found in any other than one of theſe forms.

Theſe maſſes are of various ſizes, but uſually between the ſize of a Haſel-nut and a Walnut, few ſingle balls exceeding that. They are naturally ſingle and ſeparate, and are either found looſe in rills of Water in caverns, or fixed on their floors. They ſometimes, however, make botryoide cluſters of a very pretty appearance. They are each compoſed of a number of conſiderably thick plates or cruſts, not well fitted to one another, nor cloſely joined, but often undulated, and riſing into ſmall arched hillocks in different parts, and leaving cavities in the places between the arched cruſt, and that immediately under it; which ſometimes continue abſolutely empty, ſometimes are filled with a coarſer Spar; but uſually are only filled in part by irregular ſhoots of a very pure and fine Spar, from the inner ſurface of the riſing cruſt. Theſe have uſually a firm and ſomewhat large nucleus of a coarſer Spar; and ſometimes, indeed, this makes the greater part of the Body, being covered only by two or three cruſts. Theſe cruſts are all regularly and evenly ſtriated tranſverſly, and compoſed of oblong, and very narrow, irregularly angular Bodies. Theſe are all of the ſame length, all very ſlender, and have an irregular number of planes, with obtuſe angles.

They are ever of a rough and deeply chagreened ſurface, the wrinkles being large, and the protuberances between them all obtuſe, or of a roundiſh figure, the whole ſurface indeed not ill reſembling the botryoide tubera and eſfloreſcences on the common cruſtaceous Spars. This Species is naturally of a pale greyiſh-white in colour; ſometimes, indeed, it is tinged faintly with brown, and ſometimes with a pale fleſh-colour: theſe are, however, rare accidents. It is conſiderably bright and ſparkling, and, in thin pieces, is moderately tranſparent. It is very heavy, and conſiderably hard.

It will not give fire with Steel.

It very vehemently ferments with Aqua Fortis, and is almoſt intirely diſſolved by it.

It freely calcines to a pure white.

Examined by the Microſcope, its cruſts are found of a very firm ſtructure, being compoſed of very regular arrangements of the oblong Bodies before deſcribed, which uſually ſtand very cloſe, and are firmly joined together. It is but moderately tranſparent, and is ſeen to be debaſed by a much larger quantity of Earth than the former.

It is found in almoſt all the caverns in Harts foreſt, though in none of them in any great plenty. It is alſo found in ſome of our Devonſhire mines. The *Confetti de Tivoli* are alſo of this Species.

3. *Stalagmodiaugium flaveſcens, cruſtis tenuibus, ſuperficie echinata.*

Yellow thin-cruſted Stalagmodiaugium, with an echinated ſurface.

THIS is a Species extremely diſtinct from the other two, and made very beautiful by the pointed roughneſs of its ſurface. It is of a conſiderably pure and fine texture, and of a very regular and uniform ſtructure and appearance. It is ever found in form of a ſmall roundiſh ball, ſometimes perfectly orbicular, but more frequently a little oblong, and theſe either looſe and ſingle, or joined many together in form of a botryoide cluſter, in which ſtate they make a very elegant and beautiful appearance. Theſe cluſters are uſually found clear from all other Bodies; ſometimes, however, they are ſurrounded by a coarſe Spar, and ſometimes both this and all the other Species of Stalagmitæ, the firſt only excepted, are found, though ſeparate from one another, yet immerſed in the ſubſtance of large maſſes of a coarſer Spar.

This, however, in the Stalagmitæ, naturally of a larger ſize, is not common: theſe are more regular in their ſize than moſt of the other ſpecies, few of them being found much larger than a nutmeg, and ſcarce any much ſmaller. They are compoſed of a great number of thin cruſts, laid very evenly and regularly one over another, and all much of the ſame thickneſs: the central part in this ſpecies is uſually a round or oblong nodule of a coarſer Spar; but ſometimes it is only a cavity, lined with fine oblong ſhoots of a perfectly clear and bright ſtraw-coloured Spar. The outer cruſt, which makes the ſurface of the Body, is very remarkably rough and pointed all over, the wrinkles on it being very narrow and deep, and the protuberances between them riſing into irregularly angular, but generally very ſharp-pointed Bodies.

It is naturally of a pale-yellow, but not without ſome ſlight tinge of brown; but ſometimes the brown is the predominant colour, and at others has a faint reddiſhneſs mixed with it, and the yellowneſs is almoſt loſt.

It is conſiderably bright, and moderately tranſparent; andis very heavy, and but ſoft and friable.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt intirely diſſolved by it.

It freely calcines to a pure fleſh-colour.

Examined by the Microſcope, the cruſts are ſeen to be all of the ſame regular and equal thickneſs, all pretty firmly joined together; but where-ever there are any ſmall cavities between them, they are always filled up, in ſome meaſure, by ſmall, but very numerous pointed Bodies, like thoſe of the outer coat. The cruſts are all compoſed of oblong Bodies, nearly of the ſame breadth and thickneſs, but irregularly angular, and all arranged very evenly, and laid very cloſely together.

It is found in the ſprings that run acroſs the cavern called the Devil's-arſe-of-peak in Derbyſhire, but very rarely; and is never found there, or any-where thereabouts affixed to the floor of the caverns. In ſome of thoſe on Mendip hills I found it in ſingle nodules; and in Devonſhire the miners often meet with it in botryoide cluſters.

It is very various in the number of its cruſts, but has uſually a large nucleus. In ſome of thoſe I ſaw in the caverns on Mendip hills, the baſis was a round nodule of a hard coarſe Spar, and the cruſts not more than two or three upon it; and ſometimes abſolutely ſingle, only one rough coat ſurrounding the nodule, but that one ever of the ſame echinated ſurface, and of the ſame regularly ſtriated texture, with its conſtituent oblong Bodies, the ſame as in the ſpecies compoſed of ſmaller nuclei, and more numerous cruſts.

SERIES III.

CLASS III. ORDER VIII. GENUS II.

STALAGMOSCIERIA.

Spars found in form of ſmall round balls, compoſed of numerous cruſts; Cryſtallino-terrene, and Terrene.

1. *Stalagmoſcierium minus albido-ſubfuſcum orbiculare vel ovale, ſuperficie lævi. Small browniſh-white orbicular, or oval Stalagmoſcierium, with a ſmooth coat.*

THIS is a very elegant and beautiful Body, but one which little ſhews its nature or ſtructure to the naked eye; and has been thence hitherto much miſtaken. Many who have ſeen it, taking it for a ſolid nodule of a common Stone, have called it no other than a Piſolithos. Dr. Woodward, ſeeing it broken in ſome places, and ſhewing its hollow ſhells or cruſts, not examining it farther, took it for a congeries of the pellicles of the ova of fiſhes: and the generality of writers have called it according to

its

its various ſizes, the Ammites or Ammonites, and the Cencrites and Meconites, as it reſembled the grains of Sand, or the ſeeds of Millet, or the Poppies. Fire, acids, and the other teſts, however, prove it at length to be a perfect Sparry Body; and the Microſcope ſhews it, even in its ſmalleſt maſſes, to be a true and regular Stalagmites.

It is of a tolerably pure texture, and much leſs debaſed by Earth than the common Terrene Spars, and is a regularly form'd and perfect Body, being always found either in a perfectly orbicular form, or one a little tending to oval; or, laſtly, one of an orbicular or oval circumference, but compreſſed and flat. It is ever ſmall; yet it varies conſiderably in degree. The largeſt ſpecimens of it are ſeldom more than of the bigneſs of a ſmall vetch or tare, and many of them never arriving to the ſize of a large grain of ſand.

It is from this diverſity of ſize that the maſſes of it have received their different names; but theſe can be no regular diſtinctions, ſince they are often found of all ſizes in the ſame maſs, though in ſome others the ſpecimens all keep to pretty nearly the ſame bigneſs. They appear all of a very ſmooth and even ſurface, but not at all gloſſy or polite, and are ſeldom found ſingle, but uſually amaſſed together in cluſters, either alone or ſurrounded with a coarſer Spar, and not unfrequently are found looſe from one another, but immerſed in great multitudes in a white and coarſe Terrene Spar, looking like the dry'd morter of an old wall, and at other times in a fine black and ſhining Spar, in which they make a very elegant figure; nor are there wanting inſtances of both theſe ſubſtances concurring to make the maſs for the reception of theſe ſmall Stalagmitæ, the Bodies themſelves being bedded in cruſts of the black Spar, and the coarſer white one ſurrounding or intermixed with it. When broken, theſe ſmall Bodies are found compoſed of a vaſt number of extremely ſlender, but very beautiful and regularly arranged cruſts, and form'd upon a very minute nodule of the ſame coarſe Spar in which they are lodged, or elſe on a moderately large central cavity, either totally filled, or at leaſt thoroughly lined with irregular concretions of the ſame bright and pure black Spar.

It is of a pale whitiſh-brown colour, and of a very dull look to the naked eye, carrying not the leaſt appearance either of brightneſs or tranſparence.

It is but moderately heavy, and very ſoft and friable, eaſily ſplitting into its conſtituent cruſts, or crumbling to powder.

It will not give fire with Steel.

It very violently ferments with Aqua Fortis, and is almoſt totally diſſolved by it.

It very readily calcines to a pure white.

Examined by the Microſcope, the whole ball appears a very neat and elegant Body, of a very pale whitiſh-brown, of an extremely equal ſurface, yet a little, tho' very ſlightly, chagreen'd, and riſing between the wrinkles into roundiſh or obtuſe tubera. When broken, it appears compoſed of a great number of cruſts, all of the ſame regular thickneſs. Theſe all ſeparate evenly off, one after another; and leave the Body ſtill ſmaller and ſmaller, but regularly of the ſame ſhape to the nucleus or central cavity. Theſe cruſts are all ſeen to be of a regularly ſtriated texture, and compoſed of very ſlender, angular, oblong concretions. They do not cohere at all firmly together, but have often ſpaces between, filled up with a coarſer and more debaſed Spar; and that is the reaſon of their ſeparating ſo eaſily. Where this coarſer matter is wanting, the cavities are in part filled up with ſmall protuberances, like thoſe on the ſurface of the outer coat, all ariſing alſo from the outer ſurfaces of the next internal cruſts.

It is found in plenty in the mines at Goſſelaer in Saxony, nor is our own country without it, many ſpecimens of it having been met with in Derbyſhire and in Yorkſhire.

2. *Stalagmoſcierium minus albido-ſubfuſcum, cruſtis tenuiſſimis, nucleo majori.*

Small browniſh-white Stalagmoſcierium, with very thin cruſts, and a large nucleus.

THIS is a very ſingular and very remarkable little Body, and never is found looſe or ſingle, but always in vaſt quantities together, buried or immerſed in a coarſer or finer Sparry ſubſtance. It is of a conſiderably foul and debaſed texture, and has much more of the appearance of a coarſe Stony matter than of a Sparry body. It is generally pretty equal in ſize, and rarely exceeds that of the heads of the larger ſort of pins.

It is of a regularly orbicular or oval figure, but uſually ſomewhat flatted, and is ſometimes found in botryoide cluſters, without any other cement than that of its own ſurfaces, the ſeparate Bodies cohering together where they come into contact; but it is more frequently found, whether thus cohering, or with each ſeparate concretion, looſe from the reſt, all immerſed together into a coarſe Terrene Spar of an opake whitiſh hue.

The Bodies themſelves are of a ſomewhat uneven ſurface, and have a ſcabrous look; but don't ſeem ſo regularly or elegantly protuberant as thoſe of the other Species. When broken, each is found to be compoſed of a large nucleus of the ſame figure with the whole, and compoſed of a very much debaſed Spar, coated over with two, three, or four, ſeldom more, extremely minute and thin cruſts. Theſe are each of a regularly ſtriated texture, and are but very irregularly and unevenly laid together, covering each other in a looſe manner, and often ſcarce touching any-where: they are for this reaſon readily ſeparated with the ſmalleſt violence, and, on breaking the maſs, uſually all ſplit; and, letting the nuclei out, are left themſelves in form of ſo many ſemicircular cavities.

It is of a very pale-browniſh hue, with much tendency to whiteneſs; and is merely of a Stony appearance, having, to the naked eye, not the leaſt of the Sparry look.

It is very light, and extremely ſoft and brittle.

It will not give fire with Steel.

It ferments very violently with Aqua Fortis, and is in great part diſſolved by it.

It is very eaſily calcined to a whitiſh grey.

Examined by the Microſcope, each ſingle Body appears of a ſcabrous ſurface with very little brightneſs. Its outer coat is much like the whitiſh cruſt of the ordinary Pebbles, and, like it, wrinkled in ſome degree; but it is alſo ever, as it were, broken, or eroded into ſmall irregular holes. When broken, the nucleus is found to be a mere coarſe Spar, and the cruſts each compoſed of very looſe and diſorderly arrangements of oblong and very ſharply angular Bodies. Theſe cruſts cohere but extremely looſly together, and have often a ſmall coat of the ſame Spar that forms the nucleus between them. This is extremely ſoft and friable in ſo thin a cruſt; and therefore the Bodies, on breaking the maſs, not only eaſily break, and let out the nucleus, but the cruſts eaſily ſeparate from one another, and leave only the outer thin ſhell in form of a hollow cup in every part of the maſs.

It is found in many of the tin-mines in Cornwall, in ſmall nodules, at conſiderable depths, uſually in larger or ſmaller caverns, or in fiſſures of rocks. It has alſo been found in Yorkſhire, both in the hills, and on the ſea-ſhores, but that rarely.

The famous Ketton-ſtone of Rutland, ſo much miſunderſtood in name, as well as in its nature, and now uſually called Kettering-ſtone, and ſuppoſed to be compoſed of the pellicles of the ova of Fiſhes, is no other than an immenſe congeries of this Stalagmites lodged in a harder cementitious Spar; and its numerous cells, which repreſent the pellicles of theſe ova, are only the outer cruſts of theſe Bodies with the nuclei fallen out, as they ever do almoſt univerſally on breaking the maſſes of them, but particularly in breaking this Stone when the cementitious matter is harder, and capable of making infinitely more reſiſtance than they.

APPENDIX to CLASS III.

Spars *influenced in their figure by an admixture of metalline particles.*

Order I. CUBIDIA.

Cubic, owing their figure to Lead.

1. *Cubidium decolor, ſquammis tenuioribus.*

Colourleſs Cryſtalline Cubidium, with thin flakes.

THIS is a very ſingular ſpecies of Spar, and in moſt reſpects is analogous both in form, and in the manner of its formation, to the Cryſtals influenced by the ſame metal. It is of a very remarkably clear and fine texture, ſeldom ſubject to flaws or other foulneſſes, and often emulating the appearance of the pureſt Cryſtal. It is ever of a determinate and regular figure, a true and exact Cube, compoſed of ſix equal planes, placed at right angles one with another, and never deviates, even in the ſlighteſt degree, from this form.

It is found of various ſizes, from the tenth part of an inch to two inches in diameter, though the larger ſpecimens of it are very rare; and is compoſed of almoſt innumerable thin and equal plates, not made up of arrangements of ſmaller Bodies, at leaſt the greateſt aſſiſtance to be had from Glaſſes can diſcover none ſuch, but ſeeming plane, and even ſingle flakes, like thoſe of the finer foliaceous Talcs; theſe either partly or intirely cover ſingly the ſeveral ſurfaces of the planes; and very often the angle of either will be ſeen not to divide two of theſe flakes, or be made by their commiſſure, but to be covered with a continuation of the plate that covers ſome one ſurface, and is extended over it to a greater or leſs breadth along the adjoining one. The ſurfaces of theſe Bodies all appear to the naked eye perfectly ſmooth, even, and plane, and very polite and gloſſy.

It is of an extremely pure Spar, being of no ſenſible colour in its natural ſtate, but like the pureſt Cryſtal, pellucid and colourleſs as Water: it is, however, liable to tinges from particles of the other metals, and is ſometimes beautifully ſtained to a ſmaragdine, amethyſtine, or other hue, but to none ſo frequently as that of the paler Topaz. In whichever of theſe ſtates it is found, it is ever of a very elegant brightneſs and tranſparence; and, till brought to the teſt, may be miſtaken for pure Cryſtal, or even for ſome of the Gems.

It is very remarkably heavy, but very ſoft, and may eaſily be ſcratched with a knife.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt perfectly diſſolved by it.

It very freely calcines to a pure white.

Examined by the Microſcope, it appears plainly compoſed of multitudes of extremely minute and thin cruſts extended over one another; and all the ſurfaces, tho' to the naked eye they appeared perfectly ſmooth, are ſeen to be marked in a thouſand places by ſmall irregularly undulated prominent ſtreaks or ridges, which are the extremities or edges of the plates, that have been either lodged on that ſurface in too ſmall a quantity to extend all over it, or have been depoſited on an adjoining plane in too large a quantity for its covering; and, when ſufficiently dilated by the ambient fluid to be of the thinneſs of the reſt, have reached over the determinate edges of that ſurface, and fallen on the contiguous one, covering ſo much of that as the quantity would permit.

This is the hiſtory of the ridges diſcovered by the Microſcope on the ſurfaces of theſe Cubes, and may ever be traced out by a careful examiner of them on a large and perfect ſpecimen.

It is not difficult to learn from this what has been the proceſs of nature for the formation of this Body, the firſt concretion of this Spar having been determined by the Lead imbodied in it to form a regular Cube, and the added matter having only covered that with fine thin cruſts, and conſtantly kept up its form to whatever bulk it at length arrived. This is alſo made yet more plain by ſome accidental foulneſſes that ſometimes, though rarely, happen in the formation of theſe Bodies. I have ſeen one or two where an earthy matter became mixed in ſome conſiderable quantity with the ſparry, in part of the maſs; and in this caſe it is eaſy to diſtinguiſh the manner of formation of the whole, the more pure part within this making the appearance of a ſmall Cube, as regular as the whole, and included in a larger.

It is not very plentiful with us, though found in ſome of our lead-mines in Yorkſhire; but at the Goſſelaer mines in Saxony it is frequently met with, tho' uſually ſmall.

2. *Cubidium lacteum ſquammis craſſiuſculis.*

Milky Cryſtalline Cubidium, with ſomewhat thick cruſts.

THIS is a very beautiful Body, but leſs ſo to the former Species. It is of a conſiderably fine and pure texture, but ſomewhat debaſed by a white Earth diffuſed through it: this, however, is uſually very equally blended with the whole maſs, and ſeldom gives ſpots or blemiſhes in any part of it. It is ever of a determinate figure, never deviating in the leaſt from a true and regular Cube.

It is found of various ſizes, but the moſt frequent of theſe is of about third of an inch in diameter. It is ſometimes ſeen ſingle, ſometimes concreted in great numbers into irregular maſſes; and often, where this has happened while the Cubes were yet ſoft, they are in ſome degree injured in their figure in the inner part of the maſs. Whether ſingle, or thus collected into cluſters, it is, however, always of the ſame order of formation, and is ever compoſed of a great number of ſomewhat thick and coarſe cruſts; the earthy matter, which is ever imbodied in this Species, probably hindering the Spar from expanding into that fine and thin form, which it is capable of when more pure. It is ever of very bright and gloſſy ſurfaces, but theſe are on none of the planes perfectly ſmooth or polite, but ever ridged, and irregularly ſtreaked with the extremities of imperfect plates, or flakes, which, having been extended over ſome one of the adjoining planes, have been afterwards driven over the angle, and fallen on theſe; and not being ſufficient in quantity to ſpread over and cover this, have made a very viſible prominent ridge where they terminated: this, if the quantity of matter next added to that plane has been enough to cover the whole, or but to reach up to the edges of it, is obliterated; and that additional matter, if it extends over its edge, and does not reach to the extremity of the plane or angle between that and the next plane, makes juſt ſuch another ridge where it terminates: and if it be conſidered, how nicely exact the quantity added at each time muſt be, to cover the whole plane it is added to, and nothing more than that plane, and that there is one determinate thinneſs to which it muſt be extended, reach as far as it will, it will ſeem no wonder that theſe planes have all of them ſurfaces thus ridged; nor is it at all leſs ſo in the former Species, only there the aſſiſtance of the Microſcope is neceſſary for what in this caſe, where the Spar is coarſer, and conſequently the plates are thicker, is diſtinguiſhable by the naked eye. This is naturally of a milky hue; but is ſubject to all the metalline tinges, and is very frequently found green and yellow.

It is moderately bright and tranſparent, and is very heavy, and of but little hardneſs.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt intirely diſſolved by it.

It calcines but ſlowly, but to a pure and fine white.

Examined by the Microſcope, its plates are ſeen to be conſiderably thicker than thoſe of the former ſpecies, but they are as evenly diſpoſed and cloſely connected as in that.

It is found in Derbyſhire, Yorkſhire, and other counties of England, where there are lead-mines; but is uſually ſmall, and is no-where very plentiful.

SPARS *influenced in their figure by metalline particles.*

ORDER II. TETRAPYRAMIDIA.

PYRAMIDAL, with four planes, owing their figure to Tin.

1. *Tetrapyramidium albido-fuſcum hebes.*

Whitiſh-brown dull Tetrapyramidium.

THIS is a very ſingular Species, and tho' never very bright or pellucid, yet is often remarkably beautiful in its figure and diſpoſition. It is of a ſomewhat foul and coarſe texture, conſiderably debaſed by Earth; but is ſeldom ſpotted or fouled by any particular blemiſhes, the Earth in the ſtructure uſually being very equal, blended and diffuſed through the whole maſs. It is of a very regular figure, being ever found in form of a ſhort quadrilateral pyramid, very broad at the bottom, and terminated in an obtuſe point.

Theſe Pyramids are of various ſizes, from onetenth of an inch to an inch in height, and are uſually equal to their height in the diameter of their baſe. They are never found looſe or detached from other Bodies, but always adhering to ſome ſolid Body, and without any appearance of a column to ſupport them in the way of the more common pyramidal Spars and Cryſtals. Theſe Bodies are all of tolerably ſmooth and ſomewhat gloſſy ſurfaces; but, nicely examined, they appear ridged with irregular ſtreaks made by the edges or extremities of the plates, of which the whole pyramid is compoſed. Theſe are conſiderably thick, and appear all very evidently to have been propagated from near the point or ſummit of the Body toward its baſe: they never are carried over into the adjoining planes, if too much for that they are laid on, but form very frequently a protuberance near the baſe. Hence alſo the ſides or planes of the pyramids are rarely perfectly equal. Indeed it is no uncommon ſight to meet with one of them near twice as broad as the reſt. Theſe are ſometimes found ſingly affixed to the cruſts in ſolid ſtrata, or to large maſſes of ore; but they are more frequently found in great numbers together in form of a cruſt, or ſurrounding ſmall nodules in a very beautiful manner.

It is of a pale whitiſh-brown colour, ſeemingly made up of an admixture of a fine light white Earth, with a brown metalline tinge, the natural colour given by Tin to all pellucid Foſſils.

I have not met with it ſtain'd to any other colour; but the variety from the different degrees of this is very great in the different ſpecimens: in ſome the white is ſcarce diſcernible, but a fine deep-brown is the only viſible colour, and in others the brown is in a great meaſure wanting, and the Body has only the common milky hue of the ordinary Spars.

It is moderately bright, and ſomewhat, tho' not greatly, tranſparent.

It is very heavy, and moderately hard.

It will not give fire with Steel.

It violently ferments with Aqua Fortis, and is in a great meaſure diſſolved by it.

It calcines ſlowly to a duſky or greyiſh white.

Examined by the Microſcope, it appears plainly compoſed of cruſts propagated from the point towards the baſis; and they are very neatly and exactly evenly laid over one another, and cohere very firmly together. The protuberances formed by the over-abundant matter at the baſis of ſome of the planes are ever, if nicely examined, found to be botryoide, and analogous to the tuberous effloreſcences of the cruſtaceous Spars.

It is frequent in the mines of Devonſhire and Cornwall, and is often found at Goſſelaer in Saxony, and ſometimes in ſome parts of Yorkſhire. Where-ever it ſhould happen to appear, there is probability of Tin being found in the neighbourhood, ſince it unqueſtionably receives its form from an admixture of that metal, whoſe ſalts are naturally of that very figure; and is in Cornwall ſeldom found any-where but among the richeſt ore.

SPARS *influenced in their figure by metalline particles.*

ORDER III. RHOMBOIDIA.

RHOMBOIDAL, and conſiſting of ſix planes, owing their figure to Iron.

1. *Rhomboidium albidum tenuius, cruſtis tenuiſſimis.*

White thin Rhomboidium, with very thin cruſts.

THIS is a very ſingular Species of Spar; and, from its not having been mentioned by ſome of the writers on theſe ſubjects, who from its frequency in the very places whence many of their Iron Ores were brought, could not but have ſeen it, I am apt to believe, that it has not been ſuſpected to be what it really is, a Spar, influenced in its figure by Iron, but miſtaken for a ſmall rhomboidal Selenites. This, however, is an error that a due examination of its ſtructure cannot but ſufficiently guard any one againſt for the future; for tho' ſomewhat of the external form of thoſe Bodies, yet it has acquired that form by ſuch a very different proceſs and order of formation, and the veſtigia of that are ſo plainly marked upon it, that it muſt appear to an eye at all accuſtomed to theſe examinations, a very different Body.

It is of a moderately fine, pure, and equal texture; and, tho' ſlightly debaſed by the common white adulterating Earth of Cryſtals and Spars, yet that is ſo equally and regularly diffuſed thro' it, that it very rarely forms any ſpots or blemiſhes in it. It is ever of a determinate and regular form, a perfect rhomboidal Body, conſiderably broad in proportion to its length, and remarkably thin.

It is found of various ſizes, from the twelfth part of an inch to an inch and half in length. It is moſt frequently, however, found ſmall, the more uſual ſize being a quarter of an inch in length, with which the uſual proportion is about one fifth of an inch in breadth, and not above one eighth of an inch in thickneſs. It is compoſed of ſix planes, the two broader of which are uſually of a very perfect and even ſurface, and the reſt generally tolerably ſmooth; but, if nicely examined, are found to be full of ridges formed by the extremities of the plates, of which the whole is compoſed; the order of its formation having probably been this: the firſt concretion was determined to be of this regular rhomboidal form by the Iron it contained; and in the ſucceſſive application of matter of the ſame kind for the perfecting the maſs, the addition was always made to the broader planes, and, being dilated over them, has fallen over their edges, and by that means made the other planes. It is neceſſary, therefore, that the broader planes muſt be all ſmooth, and free from ridges, as they are all of a piece, all covered by one continued plate; whereas the others, made up of plates propagated to different extents from theſe, muſt as neceſſarily have ridges and ſtreaks, where thoſe plates terminated. The ridges, if compoſed of ſingle cruſts, which, in this Species, are extremely thin and fine, would be ſcarce diſcernible to the naked eye; but they are are uſually made up of a great many plates, terminating at the ſame place, and making together only one viſible ridge. It is naturally of a milky whitiſh hue, and ſeldom is found tinged with any other colour. It is moderately bright and tranſparent, and is conſiderably heavy, but very ſoft.

It will not give fire with Steel.

It ferments very briſkly with Aqua Fortis, and is almoſt intirely diſſolved by it.

It freely calcines to a pale fleſh-colour.

Examined by the Microſcope, the broader planes are ſeen to be truly compoſed of ſingle plates, and the others of the edges and extremities of complex ones; but the ſeveral ſingle ones that enter the compoſition of theſe, are all very nicely and evenly joined, and cohere firmly together.

It is found in many parts of the foreſt of Dean in Glouceſterſhire; ſometimes ſingle and looſe, but more frequently either cluſtered together in large quantities, without any other cement, but cohering firmly one to another, or affixed by their broad planes to the Iron ores, principally to thoſe of the cruſtated Kind.

2. *Rhomboidium albido-fuſcum craſſius, cruſtis craſſiuſculis.*
Whitiſh-brown thick Rhomboidium, with thicker cruſts.

THIS is of tolerably pure and equal texture, but is ſomewhat more debaſed by Earth than the former Species; and is not unfrequently found ſpotted, ſtained, and full of blemiſhes, clouds, and flaky flaws. It is ever of an exactly regular figure, ſomewhat thick rhomboidal one, compoſed of ſix planes. It is found of various ſizes, but moſt frequently ſmall: the length of a barley-corn ſeems its moſt uſual ſtandard, tho' it is ſometimes found up to two inches length.

It is compoſed of a number of fine equable cruſts; but not ſo thin, nor ſo regularly diſpoſed, as in the former Species: the ſurfaces of this are alſo therefore more unequal and ridged than in that. The broader planes are in this rarely covered by one continued ſingle cruſt, and the others never are ſo; hence the broad planes are ſubject to unequal ridges, and undulated lines, as well as the others, tho' they are not ſo numerous or frequent on theſe as on the narrower. Theſe ridges are plainly the extremities of the plates formed by the expanſion of the matter added from time to time for the increaſe of bulk in the maſs, and all ſeem the edges of ſingle cruſts of this kind; and theſe appear, therefore, to be conſiderably thick. It is naturally of a browniſh-white hue; but is very often tinged with a faint-red throughout, and ſometimes, tho' rarely, with other colours. It is moderately bright, and ſomewhat tranſparent. It is very remarkably heavy, and conſiderably hard.

It will not give fire with Steel.

It ferments violently with Aqua Fortis, and is almoſt intirely diſſolved by it.

It very freely calcines to a fine red, or, if urged by a ſtronger fire, to a fine deep-purple.

Examined by the Microſcope, its cruſts are ſeen to be all ſingle in the ſeveral ridges, and all much of the ſame, and that a very conſiderable, thickneſs.

It is found in the foreſt of Dean, and probably in other places affording Iron Ores; and is uſually found in great cluſters together, adhering by one of its broad ſurfaces to the cruſtated Iron Ores.

THE

THE
HISTORY
OF
FOSSILS.

PART I.

BOOK II.

FOSSILS naturally and eſſentially ſimple, not inflammable, ſoluble in Water.

Of theſe there is only one known claſs.

The Bodies conſtituting this claſs are,

The ſimple SALTS.

Theſe are foſſile Bodies, ſolid, friable, and pellucid, not inflammable, but fuſible by fire, and congealable again by cold; ſoluble in Water, ſo as to diſappear in it; naturally concreting into regularly figured Cryſtals; and impreſſing a ſenſation of acrimony on the tongue.

Theſe are the characters and qualities common to all Salts, and to no other Bodies but theſe. Theſe they always manifeſt when pure, and freed from heterogeneous ſubſtances: but in the ſtate we naturally find them in, tho' they ever have that in their taſte alone that will diſtinguiſh them, yet they do not exhibit all their genuine characters; ſome of them being found ſolid and pure in the Earth, or without its ſurface, but commonly without their proper form; others embodied in Earths and Stones, as the particles of Metals in their Ores; tho' not, like thoſe, altering the Bodies they enter the compoſition of ſo greatly as to make them properly diſtinct Species of Foſſils; and others in a fluid ſtate ſuſpended in Waters.

Of the Foſſils of this claſs, nature therefore affords us three Orders; and under thoſe there are five Genera.

ORDER I.

Salts found native and pure, either within the Earth, or without its ſurface, exhibiting all their natural characters, tho' often without their proper form.

ORDER II.

Salts found not native, but in form of Ores; never pure, but diſtinguiſhable by their taſte, and immerſed in, and blended with, the conſtituent matter of Earths and Stones, in extremely ſmall and imperceptible particles.

ORDER III.

Salts naturally found ſuſpended in Waters, and in a fluid form; but always ready to appear in their proper figures, on a proper evaporation of that fluid.

SALTS.

ORDER I.

Genus I. MURIA. *Salt found dry, pure, and native in the Earth; in a ſolid form, and ſometimes hard, firm, pellucid, and emulating the appearance of Cryſtal; tho' at others in a ſofter ſtate, and ſometimes ſuſpended in Water, and in a fluid one: not fermenting with acids; and forming, according to the degree of heat, either pyramidal, cubical, or parallelopiped cryſtallizations.*

Genus II. NATRUM. *Salt found ſometimes pure, ſometimes fouled with Earth, fermenting with acids, and forming flat oblong cryſtallizations with four unequal ſides, and two truncated ends.*

SALTS.

ORDER II.

Genus I. ALUMEN. *Salt found immerſed in imperceptible particles, in the ſubſtance of harder and ſofter Stones, as the particles of metals in their ores; and diſcoverable in theſe Bodies by a ſharp, rough, and ſtyptic taſte; ſometimes alſo found native and pure, in form of an effloreſcence, or of a ſhapeleſs Salt, having been waſhed from its ore by Water, and afterwards deſerted by it; and yielding, after ſolution, octagonal Cryſtals.*

Genus II. NITRUM. *Salt found immerſed in imperceptible particles, in earthy ſubſtances, as the particles of Metals in their ores, and diſcoverable in theſe Bodies by an acrid taſte, and a ſenſe of coldneſs, with which it affects the tongue. It is ſometimes alſo found native and pure, in form of an effloreſcence, a ſhapeleſs Salt, either on its Ore, or on old walls, &c. and yielding after ſolution long ſlender hexædral priſmatic Cryſtals.*

SALTS.

ORDER III.

Genus I. BORAX. *Salt found in a fluid form, ſuſpended in large quantities in certain Waters, and diſcoverable in them by a ſweetiſh, mixed with a brackiſh and bitter, taſte: readily ſeparable from them by evaporation; and appearing, when ſeparated, in a ſolid, bright, and tranſparent form, and in large regularly figured Bodies, affording, on a nice ſolution, octahædral Cryſtals.*

Genus II. HALCRYPTIUM. *Salt found in a fluid form, ſuſpended in very ſmall quantities in certain Waters, ſcarce diſcernible in them by its taſte, and very difficultly ſeparable from them; but, by a proper evaporation, to be procured in a dry form, in extremely ſmall particles, and in form of powder; which, when nicely examined and carefully prepared, affords many oblong quadrangular Cryſtals.*

Simple SALTS.

ORDER I.

GENUS I. MURIA.

Alimentary Salt.

SALT found pure in the earth, and ſuſpended in waters, and affording, according to the different degree of heat, cubic, pyramidal, or parallelopiped cryſtallizations.

THIS is a Body which appears to us in an almoſt infinite variety of forms in its different ſtates; but is always immediately diſtinguiſhed by applying it to the tongue; and, in whatever ſtate it is found, always aſſumes the ſame figures, after ſolution, and a regular cryſtalization. The Sea-water and Salt-ſprings ſuſtain it in immenſe quantities, in a liquid form; but, beſide this, it is found of various degrees of purity, hardneſs, and tranſparence, and variouſly coloured, as a ſolid Foſſil, in the bowels of the Earth. In the pureſt, brighteſt, and moſt beautiful of theſe ſtates, it is called Sal Gem, from its reſemblance, in pellucidity, to the Bodies of the Gem claſs. In this ſtate it is conſiderably hard and firm, of an even and regular ſtructure, and as bright and tranſparent as Cryſtal; tho' it is ſometimes more foul, and, at times, is ſubject to white flaws and blemiſhes, much like the flaky ſpecks of Cryſtal. It is, in this ſtate, uſually of no determinate figure, though it is ſometimes found in looſe or detached maſſes, emulating a cubic form, though it oftener conſtitutes ſtrata, and thoſe of an immenſe thickneſs and extent.

In theſe it uſually appears as one continued rock of Ice or Cryſtal; but, attentively examined, will be very frequently found even here compoſed of a vaſt number of very thin plates, like ſo many ſtrata, laid evenly over one another. Theſe are often, indeed, obliterated; and, where they are ſo, the maſſes ſplit or break equally in any direction; though, in the parts where theſe plates are diſtinguiſhable, they cleave much more eaſily, and that always in an horizontal direction, according to the ranges of the plates or ſtrata.

In this ſtate it is properly the Sal Gem of authors; but often it deviates from this purity and beauty, and is found in immenſe quantities, not of this fine tranſparence, or ſimple or regular ſtructure, but made up of an infinite number of ſmaller, and thoſe perfectly irregular concretions blended confuſedly together, and forming a more ſhattery maſs: theſe ſometimes are large, and the whole beautiful enough, but at others they are ſmall, and the maſſes very coarſly and irregularly formed. Sometimes alſo theſe particles are yet ſmaller, and ſcarce will hang together in lumps, and at others they are found abſolutely ſeparate, and in form of cloſely compreſſed, but diſcontinuous heaps of the common Salt ſeparated from Sea-water; yet theſe of very little regularity in their figure.

There is alſo yet another kind of common Salt, but much more ſcarce than theſe. This is ſtriated perpendicularly, and repreſents maſſes of the Fibrariæ, or, as they have been called by authors, the Fibrous Talcs. This is the moſt beautiful of all the appearances of Salt, and, till taſted, it is in this ſtate by no means to be known for what it really is.

Theſe varieties of figures, however, are not all the diſguiſes that this Body is capable of aſſuming. Its colours are often not leſs remarkable than its ſtructure; an opake red is the moſt common of all theſe, and is frequent even in the fineſt Sal Gem: a red in all other degrees is alſo common, and whole beds of it are in other places found green and blue: yellow is a leſs common colour, and black the leaſt common of all; yet a pale ſtraw-colour, and a deep lead-colour, or bluiſh black, are now and then found in moſt of the mines where Foſſil Salt is dug. When coloured, it is ſometimes as bright and tranſparent as while colourleſs; but much more frequently it is rendered foul and ſomewhat opake by it. It is conſiderably heavy in the compact maſſes, and often very hard, but may always be eaſily ſcratched. It burſts and crackles in the fire, and is fuſible, and regularly melts in a ſtronger degree of it, and remains long fixed in that ſtate, even in the moſt vehement fire.

The variety of appearances this Body is capable of putting on, and is continually found in, in its natural ſolid ſtates, may not only diſguiſe it to the inaccurate obſerver, but might alſo tempt a more careful one to divide it into ſeveral Species, and call the Sal Gem by one name, the Compact Powder by another, the Shattery Maſſes by a third, and the Striated by a fourth; but a regular examination ſhews it to be the ſame Body in all theſe forms: and when we conſider, that, by a more or leſs haſty evaporation of a ſolution of it, we can ourſelves make it aſſume more different forms than theſe, we are not to wonder, that, according to the various accidents that attended its formation in the different parts of the Earth, we there find it in theſe different ſtates.

The way to know its true figure, is either to diſſolve it into a fluid form in common Water, or to take that already diſſolved in the Water of the ſea, or Salt ſprings, and, giving this a careful evaporation, we ſhall find, that both the one and the other will afford the ſame Cryſtals, and theſe will be according to the degree of heat uſed in the evaporation, either pyramidal, cubical, or parallelopiped.

The exact ſimilarity of appearance from the ſolution of this Salt made by us in common Water, and by nature in that of the ſea, is a proof, that the Salt is, in both ſtates, the ſame, and is only in the Earth in a ſolid, in the Sea in a fluid form.

What acids are, as teſts to the other Foſſils, that common Water is to theſe. All the Salts indeed diſſolve in Water, but each has its diſtinction from the quantity of Water it takes up to make the ſolution. This Salt requires three times and one ſeventh its own quantity of Water to make a regular and perfect ſolution of it; and the ſame proportion is neceſſary, without any variation, to the Foſſile in all its ſtates, and alſo to the Sea-ſalt, and that of Salt-ſprings: hence alſo they are all evidently the ſame.

The various appearances of the Foſſile Salt are found in many parts of the world: Poland and Ruſſia abound with it, and afford many mountains of it. The fineſt, however, is found in a mountain of Catalonia, not far from Barcelona; but the greateſt mines are near the village of Wilizka. Theſe have now been opened near five hundred years. Numbers of families live in them, and there runs a rivulet of freſh Water through one part of them, ſufficient to ſupply all their occaſions. It is from hence that we have our Foſſile Salt. That of the Salt-ſprings is made by evaporation over the fire, and our common Sea-ſalt is made in the ſame manner, only uſually with leſs nicety. The Bay-ſalt is made by evaporation, merely by the ſun's heat, and is the fouleſt of all the kinds.

The Sea-water, in different parts of the world, contains Salt in very different proportions, ſome Seas affording Water that contains nine or ten drachms of Salt in the pound, others Water with leſs than half an ounce; but the more uſual ſtandard ſeems about three quarters of an ounce to the pound. And it is a common obſervation, that the Seas are fuller of Salt in the hotter than in the colder climates.

The uſes of Salt in the common occaſions of life are well known: by diſtillation it yields the Chymiſt a ſtrong acid ſpirit, and, added to Aqua Fortis, it enables it to diſſolve Gold. It diſſolves in a moiſt air, and leaves a large ſediment from that ſolution. It is apt to contract very readily a moiſture on its ſurface; but there is in ſome parts of the Poliſh mines part of it much harder than the reſt, and not ſo ſoon affected: by the aid of this they make beads, bracelets, and a multitude of other toys.

The antients ſeem to have been as well acquainted, nay, much better than the preſent, or ſome of the later ages, with the true hiſtory of Foſſile Salt. They knew it in all its ſtates, and perceived it in all its changes, to be ſtill the ſame Body. They named its ſeveral different appearances from the different countries they were found in; but called them all by the general name Salt, and never miſtook them for any other than what they were, the variations of nature in the ſame ſpecies of Body. They ſeem indeed to have known all the appearances or varieties we know of it, and no more. Pliny mentions various colours in it, and the places which produced them. *Ruber Memphi, rufus circa Oxum, centuripis purpureus, in Cappadocia croceus effoditur*, l. xxxiii. p. 560.

The principal varieties we find in the Foſſile Salt are three, 1. the hard, rocky, and cryſtal-like kind; 2. that compoſed of numerous, flat, horizontal beds; and, 3. the ſtriated. The hard rocky kind, or common Sal Gem, Pliny evidently deſcribes, *l.* xxxiii. *p.* 559. *Sunt & montes nativi ſalis, ut in Indis, in quo lapidicinarum modo cæditur.*

The plated kind he not leſs evidently mentions, and very aptly, from its ſtructure and tranſparence, compares it to the *lapis ſpecularis. Effoditur & in Cappadocia quidem ſpecularium lapidum modo.*

The third or ſtriated kind, ſo ſcarce, and almoſt unknown, among us, was very common, and in great eſteem, among them. This was their Sal Ammoniacum, or, as ſome barbarouſly called it, Sal Armoniacum, as they have done the Gum Ammoniacum alſo Armoniacum. Many have ſuppoſed this to be a different ſpecies of Salt; and ſome have idly imagined the factitious ſubſtance, which we call Sal Armoniac, to be the ſame; but this there is no ground for believing from any thing the antients have left us.

Dioſcorides plainly deſcribes Sal Ammoniac as the common Salt, the ſame with the various kinds of Sea-ſalt and Sal Gem, all which he had judgment enough to know were really the very ſame Body in different forms, and calls it the beſt of all the kinds. There is no room for the leaſt ſhadow of a doubt, in regard to this author's having determined Sal Ammoniac to be common alimentary Salt, the ſame with Sea-ſalt, only in another form, becauſe he excellently and particularly deſcribes all the uſes, properties, and virtues, of alimentary or common Salt; and that in ſo expreſs and accurate terms, that there is no poſſibility of imagining that he means any other body; and in the ſame place tells us, that this Salt, when found foſſile, was better than when made by art from Salt-water, though abſolutely the ſame body, and that of the foſſile kind the Ammoniac was the beſt. Sure there can be no doubt from this, that the Ammoniac, as well as the common foſſile Salt, called by us Sal Gem, and well deſcribed by the ſame author, in the ſame place, were only different figures into which common Salt form'd itſelf: or if there could be here any fear of a miſtake in the copies, the properties given afterwards in common to this with Sea-ſalt, muſt amply prove that it was well known to be the ſame in thoſe days.

The author deſcribes it fiſſile, and compoſed of ſtrait regular fibres. The moſt of the writers on theſe ſubjects having never ſeen or heard of any ſuch figured common Salt, and knowing no ſtriated Salt but our Sal Armoniac, gave riſe to the error of imagining that to be the Sal Ammoniacum of this author, though its properties and qualities by no means agree with what he has written of it: but tho' theſe gentlemen had ſeen no ſuch foſſile Salt, there is ſuch, and that in conſiderable plenty ſtill in the world. The cabinets of the German virtuoſi, moſt of them, afford it as clear as Cryſtal, and of this regularly ſtriated ſtructure, and eaſily fiſſile, according to the deſcription of Dioſcorides; and there is one piece of it in England, though not quite ſo pure; this is in the collection of Mr. Baker, and was brought into England by Dr. Pocock.

Nay, the excellence of this Sal Ammoniac above all other kinds of alimentary Salt was ſuch, that it became afterwards common to uſe the word Ammoniacum for Salt in general, as we call the Indian bark, the Bark, by way of eminence. The Greek μιλχ, is, by the beſt critics, rendered in Latin Ammoniacum, though plainly no other than the Arabian word Milh, with the *h* turn'd into χ, as was often the caſe between the Arabic and Greek words, as in the αλκαννα of the Greeks for the *Alhanna* of the Arabians, and the word Milh in the Arabic ſignifies no more than alimentary Salt; the beſt kind of which being the Ammoniac, the word Ammoniacum was not improperly applied to common Salt in general; and the oldeſt tranſlators of Aviſenna give into this, tranſlating the head of his chapter of Salt, *de Ammoniaco, id eſt, de Sale* of Ammoniacum, that is, of Salt.

Surely it muſt be plain enough from this, that Ammoniacum and alimentary Salt were received in the earlier ages as ſynonymous terms, and conſequently that the true Sal Armoniac of the ancients was no other than common Salt in its beſt ſtate. The words in which Dioſcordes deſcribes it, εὔσχιστον καὶ εὐθειας τὰς διαφύσεις ἔχον, cannot but make it extremely clear to any one who ever ſaw the ſtriated Sal Gem, that this which has all the characters of common Salt, and thoſe are what that author gives the Sal Ammoniacum, and is ſtriated, is really the Salt he knew by that name.

Pliny's deſcription of this Salt is by no means conſiſtent either with itſelf, or, in ſome part of it, with the accounts we have of the ſame Salt from the antients. He in one part gives its qualities and properties different from what any other old author has mention'd of it; and in another ſeems to have borrow'd the very deſcription of Dioſcorides. He ſays, in one place, that it was *non pellucidus*, and *ingratus ſapore*, which by no means agree with the accounts of any of the antients beſide; and, in another, that it was *perſpicuus*, and *rectis ſciſſuris*, which is Dioſcorides's account. Whether it be that Pliny has given us too careleſs tranſlations of his authors, or elſe has taken his accounts from different ones; or whether the text is corrupt, is not eaſy to ſay; but, however that be, it is plain that we can have no dependence on what we find there.

Dioſcorides, however, we ſee has plainly determined the Sal Ammoniac to be our ſtriated foſſile alimentary Salt, and Aviſenna plainly countenances the ſame account. The three properties he gives us of Sal Ammoniac, which with him alſo is plainly alimentary Salt, not any other kind, are, that it be eaſily fiſſile, tranſparent, and clear and fair as Cryſtal. The general opinion of this Salt's having been formed from the urine of Camels dried in the ſand, has no foundation from any thing the antients have ſaid about it; nor can that indeed poſſibly have been the truth in regard to the true Sal Ammoniac of earlier times, which could never have been an alimentary Salt, or one fit for uſe among food, had it owed its origin to ſuch matter.

It is very plain, that what we now call Sal Armoniac is a factitious ſubſtance, a chymical preparation; and, whatever may have been imagined about it, it certainly never was, nor ever can be found truly native. There have indeed been accounts of ſome of it made by a ſort of natural chymiſtry in the mouths and openings of the burning mountains; which might not ſeem improbable, as it is always an effect of ſublimation by fire, and has, in a great meaſure, its origin from ſoot; but the ſubſtance found there, naturally ſublimed, when brought to the trial, never proves to be true Sal Armoniac, either of the antient or modern kind, but uſually affords Cryſtals the ſame with thoſe of common Salt, and ſeems no other than Sea-ſalt, but half-mixed with ſoot by an irregular ſublimation.

The antients had alſo two other ſubſtances of the Salt-kind, or eſteemed ſo in their *Materia Medica*; the *Haloſachne*, or ſalt-froth, and the *Haloſanthos* or flower of Salt, Dioſcorides has given us full accounts of both; and by theſe we find, that the firſt was a true Sea-ſalt, but the latter a very different ſubſtance, though they did not diſtinguiſh it as ſuch.

The *Haloſachne* or ſalt-froth was no more than a Sea-ſalt made by the evaporation of ſmall quantities of Sea-water by the Sun's heat on rocks, and no way differed from the common Sea-ſalt in its virtues or properties, except that it did not crackle ſo much in the fire, which was wholly owing to its being compos'd of finer particles, and in form of powder; in which ſtate, even common Sea-ſalt will no more crepitate in the fire than this. Dioſcorides's account of this is very accurate and expreſs. He ſays, it was a congeries of ſmall particles driven up from among the Water of the Sea in form of froth, and found adhering to and lodg'd on ſmall rocks; and that its virtues were the ſame with thoſe of the ſeveral kinds of alimentary Salt. It ſhould not be forgot in this place, however, that this *Haloſachne* ſometimes is found imbodied among the matter of the *Alcyonia*, and ſuch other ſubſtances, and then appears in an harder and leſs diſtinguiſhable form.

The *Haloſanthos* or flower of Salt of the antients was, however, a very different ſubſtance; and was rather a Bitumen than a Salt, tho' properly neither alone, but a mixed body of both and of other ſubſtances. It was a tough, viſcous, and fatty ſubſtance, found ſwimming on the Waters of ſome ſprings and rivers, and was of a ſoft conſiſtence, and yellow colour. We find the ſame ſubſtance to this day in the ſame places, and that not only yellow, but of all other colours, red, green, blue, &c. Theſe it takes up according to the various Earths it waſhes againſt on the ſhores, or has pick'd up, and mix'd among its own matter at its original production. It is a very foul ſubſtance, and is found on examination to be a Bitumen of the ſofter kind, ſeparated as the other liquid Bitumens from the Earth, and floating on the ſurface of the Water, where it becomes ſometimes impregnated with Salt, and ſometimes with various Earths.

The deſcription given us of it by Dioſcorides is very good, and ſufficiently accurate and expreſs to diſtinguiſh it from all other bodies. He ſays, it was found ſwimming on the Waters of the Nile, and of ſome lakes; that it was yellow, and of a very unpleaſant ſmell, ſharp to the taſte, and fattiſh; and that it was ſoluble in Oil, not in Water. This, though the author did not diſtinguiſh to what claſs of bodies the ſubſtance belonged, is however ſufficient to teach us what it truly was. and that it muſt have been a Bitumen, not a Salt, ſince he ſays it was ſoluble in Oil, not in Water.

Simple

Simple SALTS.

ORDER I. GENUS II.

NATRUM.

The Nitre of the Antients.

SALT found ſometimes pure, and ſometimes fouled with Earth; fermenting with acids; and forming flat oblong cryſtallizations, with four unequal ſides and two truncated ends.

THE Natrum, or Nitrum of the antients, is a native Foſſile ſubſtance, which was once in great uſe, but of many ages has been now neglected, and perhaps has not been perfectly known to any of the late writers on theſe ſubjects.

There have not been wanting ſome who have idly imagined our Nitre, or Salt-Petre, now in uſe, to be the ſame with the Nitre of the antients; but the more judicious have given no countenance to this opinion; and it is evident, from the properties and qualities of both, they they muſt be extremely different ſubſtances.

This is the Nitre of the moſt early ages, the ſubſtance called by that name in the ſacred writings of Solomon, and of the prophet Jeremiah; and it is plain, that it long continued in uſe, and retained its name: for whatever may have been imagined by ſome, it appears plainly to be alſo the Nitre of the Greeks; and the Nitrum and Aphronitrum of Dioſcorides; for theſe were only varieties of appearance in the ſame ſpecies of body; and the Nitre of Pliny.

It is one of thoſe Salts not found in diſperſed particles in other ſubſtances, Earths or Stones, as the particles of metals in their Ores, but uſually pure, and collected into maſſes of the ſame determinate ſtructure: and is produced in ſuch plenty in ſome parts of the world, that it might be perhaps at this day made a very profitable branch of commerce, not as any thing of the nature, or ſuited to ſupply the place of our Salt-Petre, but as proper for what the antients uſed it, the ſupplying the place of the fixed Salts, of Vegetables, and making Soap and Glaſs.

It is much more eaſily deſcrib'd and known than the alimentary Salt, as it is commonly ſeen in one and the ſame form. It is found in broad and flat maſſes of various ſizes, but uſually ſmall, of a conſtant, regular, and uniform texture, and is commonly perfectly pure in itſelf, tho' ſubject to admixtures of ſmall particles of the Earth it is found among on its ſurface, and ſometimes in the pores or interſtitial ſpaces of its inner ſtructure; theſe may, however, be blown off from the ſurface, and, on breaking the maſſes, may be diſlodged from within them, the Salt being afterwards found itſelf pure and clear, and not debaſed by any admixture of them in its ſubſtance. Theſe ſmall maſſes are never of any regularly angular form, but are always thin, and uſually flat and even, though ſometimes waved, bent, and crooked, and are ſometimes of a tolerably even, tho' ſometimes wav'd, bent, and crooked, and are ſometimes of a tolerably even tho' more frequently of a rude rough ſurface, and full of ſmall irregular prominences on both ſides. When flat and even, the ſurface is however never perfectly ſmooth, but always appears more or leſs cavernous, and often is perfectly ſpungy. The flakes or maſſes of it are found from the ſmalleſt viſible breadth to that of four, five, or ſix inches, but they very ſeldom exceed a quarter of an inch in thickneſs, and are frequently of leſs than half that. They are plainly ſeen to be compoſed of multitudes of Faſciculi, or cluſters of ſmall and oblong fibres, and thoſe but looſely laid together, ſo that the whole is of a lax, looſe ſtructure, and ſhattery texture.

It is in colour naturally of a duſky white, but in this it is like the Foſſile Muria, or alimentary Salt, ſubject to ſome changes. The tinges it principally acquires are a duſky brown, and a very elegant and ſomewhat deep red. Theſe colours make, however, no difference in the ſtructure or figure of the maſs; it is, when impregnated with them, ever of the ſame ſhape as when white, and is in either ſtate of an opake and dull, not a bright or gloſſy, ſurface, and is but very faintly tranſparent. When broken, it appears of a ſomewhat brighter hue than while in the maſs, and is very evidently ſeen to be of a lax, ſpungy, and cavernous ſtructure. It is but moderately heavy, and of very little hardneſs, being tolerably eaſily broken between the fingers.

This is its uſual ſtructure and appearance in its pureſt and moſt perfect ſtate; but as the Murea is liable to coarſer ſtates than the pureſt Sal Gem, ſo is the Natrum to a coarſer appearance than that of theſe cakes.

It is found in many parts of Aſia thrown up in little hillocks on the ſurface of the earth, in form of a coarſe looſe powder. This is what has uſually been called by authors Soap-Earth: but this, when carefully examined, appears to be no other than a vaſt congeries of flat and ſhining particles, looking like ſmall flakes of Talc, intermixed with a large quantity of earth; and the nicer teſts of the Microſcope ſhew theſe to be no other than ſmall concretions, irregular, broken, and mutilated indeed, but ever reducible to thoſe of which the purer cakes are found to be compoſed when broken: theſe have naturally become mixed with a great deal of the earth, among which they are found, and together with it aſſume the form of a looſe coarſe powder. It is not however by the figure of the particles alone that this is known to be Natrum in a coarſer ſtate, but experiment will prove it for true and pure cakes of Natrum, perfectly analogous to, and undiſtinguiſhable from, the native, may be procured from a ſolution of this Salt; and the people where it is found make the ſame common uſe of both, boiling them into a lee for waſhing their cloaths, and even making ſoap of both.

It is of an acrimonious pungent taſte, and has much of the heat, ſharpneſs, and bitterneſs, of the fix'd Alkaline Salts, produced by burning, from vegetables, as the Pot-aſhes, and the like; but it has more bitterneſs, and leſs acrimony than theſe; it gives alſo a ſenſation of coldneſs on the tongue, which they do not, and leaves a laſting flavour like that of the Sea-ſalt in the mouth.

It ferments very violently with any acid menſtruum, and is totally diſſolved in it. It diſſolves in a very ſmall quantity of water; and when prepared for the re-aſſuming its ſolid form by a proper ſolution and very gentle evaporation of the water, it concretes at the bottom of the veſſels into a flat cake, perfectly analogous to the maſſes it is naturally found in, of the ſame lax, cavernous, and ſpungy ſtructure, and the ſame rough ſurface.

This maſs, thus procured by evaporation, is, when broken, found alſo ever of the ſame general ſtructure with the maſs as naturally produced; and when the evaporation has been properly managed, and finiſhed in no greater a heat than that of a warm Sun, is no way to be diſtinguiſhed from the native: its ſtructure is as looſe, lax, and ſpungy; and, when nicely examined, it appears very evidently to be compoſed of a vaſt number of oblong and irregular congeries or faſciculi of ſmall and perfectly regular concretions, each being oblong, ſlender, flatted, and compoſed of four ſides, and two truncated ends: two of its four lateral planes are conſiderably broad; theſe are placed oppoſite to one another, and may called the top and bottom of the body; the other two are very narrow, and may be called its ſides. Hence the flat figure of the whole cryſtallizations. Its ends are equally truncated, and that not perpendicularly, but ever in the ſame obliquity.

This is the true and determinate figure of the cryſtallizations of the Natrum, or Nitre of the antients, but it is rare to meet with the Cryſtals perfect; here and there one may find a few ſingle Cryſtals lodged in ſmall cavities in the maſſes, and theſe are ever perfectly of this figure; but theſe are rare, and the complex bundles of them ſeldom afford many that are perfect.

The ſmall faſciculi or bundles of cryſtallizations are of various diameters, according to the number of Cryſtals they are compoſed of; and often are made up of ſeveral concretions of different lengths and thickneſſes; but the ſame general ſtructure may be traced in all. They are very bright, and perfectly colourleſs and tranſparent: they will relent a little in a moiſt air, but will never become wet and ſoft, nor ever run *per deliquium*, as the fixed alcaline Salts procured from vegetables. Theſe are the effects of water on this Salt.

In the fire if a quantity of it be put into a ſtrong crucible, and placed among burning coals, it never in the leaſt crackles, but riſes and ſwells a little, and ſoon melts like one of the metals, continuing in a thin fuſion, and changing colour according to the degree of fire, to a ſnow-white, a pale fleſh-colour, a deep red almoſt purple, and afterwards to a pale blue, and ſomewhat faint ſea-green.

Examin'd by the Microſcope, its ſurface appears irregularly rough, and made up of multitudes of congeries of oblong, but irregular fibres, ranged into ſmall faſciculi, and thrown together in various directions. When broken, its ſtructure is ſeen to be wholly the ſame in theſe maſſes, and in thoſe procured by art, from a ſolution of the Salt in Water. The whole is in both caſes ſeen to be a cluſter of theſe faſciculi, ſome larger, and ſome ſmaller, and ſome even ſingle concretions. The faſciculi are combin'd together in a very irregular manner, and leave many and large interſtices and cavities between them. Every concretion, however, that goes to make up theſe faſciculi, is naturally of the ſame determinate figure, and that the ſame with the ſingle concretions procur'd from the evaporation of its ſolution, all flat, and made of four ſides, two very broad, two others very narrow, and all truncated at both ends. Theſe, however, are often variouſly mutilated, and render'd irregular by their ſeveral combinations one with another, and are very ſeldom perfect and fair. They are very bright and ſhining, and perfectly colourleſs and pellucid, reſembling Cryſtal, or the pureſt Sal Gem.

It is found in great plenty in Sindy, a province in the inner parts of Aſia, and is often met with elſewhere in that part of the world. It always lies either in or near the ſurface of the earth, and is collected in great quantities, and uſed there as Soap, a lye made of it being the thing uſed conſtantly there for waſhing. It might certainly be imported with advantage, as it would ſupply the place of Pot-aſhes in Soap and Glaſs making, which I can affirm from experiment, and might certainly be had in any quantity.

It is an extremely ſingular body, having all the qualities of the common fix'd Alkalis made by fire from vegetables; but having this peculiarity, that it will regularly cryſtallize, which they never will: for what has been ſuppos'd the cryſtallization of thoſe Salts, is only the ſeparation of a different Salt from them, which is neutral, not alkaline, and which they afford only a ſmall quantity of, and are the purer and more perfect for being ſeparated from, and is by no means a cryſtallization of their particles. This Salt proves to us, that whatever may have been generally ſuppoſed, there is ſuch a ſubſtance as a natural fixed Alkali, and that that ſubſtance is not neceſſarily a mere creature of the fire.

After this general inveſtigation of the nature and properties of this native Alkaline Salt, which I have ventured to call the Natrum or true Nitre of the earlieſt ages, and of the antient Greeks, it may not be improper to enquire, as far as may be, into what were the real properties and qualities of that Salt, ſo far as they are handed down to us by the authors who have treated of it, and ſee with what degree of juſtice and certainty this can be affirm'd to be the ſame ſubſtance.

The earlieſt accounts we have of Nitre, thoſe contain'd in the ſacred writtings, inform us of two great qualities of it; 1. That it was an Alkali, and would ferment even with weak acids, as Vinegar: And, 2. That it was of an abſterſive quality, and ſerv'd in the office of Soap with us, in waſhing and cleanſing things.

Solomon, Proverbs chapter xxv. verſe 20. compares the natural contrariety of ſinging ſongs with a heavy heart to that of Vinegar and Nitre: this indicates plainly, that the Nitre of thoſe times was an Alkali, as no ſubſtance but an Alkali could be ſaid to have any natural contrariety to Vinegar. And Jeremiah expreſly commemorates its abſterſive or cleanſing quality, (chap. ii. ver. 22.) he ſays, though the ſinner waſhes himſelf with Nitre, yet his iniquity is mark'd before his great Judge. This could be ſaid of no other than a ſubſtance uſed to cleanſe and take away foulneſſes: and our modern Nitre has neither this alkaline or cleanſing quality, therefore it could not be the Nitre mentioned in wholly writ; whereas this Salt has both theſe properties in a very eminent degree, and is a native ſubſtance, therefore to be found at all times, and in all ages, and ſo far probably the ſame.

The other qualities that we find traces of in the earlieſt authors, as belonging to Natrum or Nitre, are, that it was of an acrid taſte, that it was found native in Egypt, and ſome other places; that it eaſily relented in the air in a certain degree; and that it was uſed to make Glaſs, being mixed with Sand. All theſe are qualities found in the Salt here deſcribed.

Let us come next to the Days of Dioſcorides, an author whoſe knowledge in the Materia Medica can never be ſufficiently commended. This author tells us, that Nitre, when in its greateſt purity and perfection, was very light, of a looſe, lax texture, or full of cavities, and like a ſpunge, and that it was either white or red, and that it was found native in little hills or riſings of the ground.

This is a deſcription which perfectly and exactly agrees with the Salt here deſcrib'd as the Natrum, or Nitre of the Ancients, and with no other native Salt in the world: It would not be eaſy indeed to form a better, or more expreſſive deſcription of this Salt, in ſo few words, from a ſpecimen of it laid before one: and this coming from an author, who ſeems to have been well acquainted, in all inſtances, with the bodies he deſcribes, ought to be of no ſmall weight.

Pliny mentions two kinds of it, both produc'd native on the earth, the one he calls Halmyrhaga, and the other Agrium; the firſt, he ſays, was produc'd in Media, and this ſeems to have been the purer, the other in Thrace, which was uſually foul, from an admixture of earth: It is extreamly plain, from what follows, that the Nitre here mention'd by Pliny, was the ſame with that here deſcrib'd an alkaline Salt of the pot-aſh kind; for Pliny does not diſtinguiſh the Pot-aſhes, or Salt, made from burnt vegetable ſubſtances, as a peculiar kind, but mentions it under the ſame name of Nitre, and as the ſame ſubſtance only produc'd in a different manner: He adds, that it was not made in any great quantity from oak-aſhes, and that the cuſtom of procuring it in that manner was then totally laid aſide. Pliny is very expreſs in his account of Nitre, being the Salt us'd by the world, in his time, in glaſs-making, and putting this together, and obſerving that he makes the Nitre, (as he calls it,) produc'd from oak-aſhes, and that found native in Media and Thrace, the ſame ſubſtance; there can be no doubt but that the Nitre of Pliny could be no other than this Salt, which is indeed ſo like the common pot-aſhes, or Salt now made from the aſhes of the oak, or other vegetables, both in its qualities and external appearance, that a very good judge might fall into the error of Pliny, and take them to be the ſame ſubſtance: I need not add, that there is neither here, nor in any other of the accounts given by the Ancients of Nitre, any thing that can by any means ſuffer us to imagine it was the ſubſtance we now call Nitre, and which has no one of its properties; yet father Hardouin ſets out, in his notes on the account Pliny has given us of Nitre, with telling us that it was evidently the ſame with our Nitre: *Nitrum noſtrum quod Sal Petræ nominamus* Le Salpetre *idem plane eſt cum veterum nitro*, Tom. 2. p. 364. Sect. XLVI. N. 1. — People who have known more of criticiſm than of natural hiſtory, have been for reading that paſſage of Pliny, where he ſpeaks of Nitre made of the oak, in a different ſenſe; but had they known the great analogy there is between the Nitre of the Antients, and the pot-aſh made of oak, or other wood aſhes, they would have found there was no reaſon for ſtraining the ſentence, with forc'd alterations, into another meaning; when this, which it ſo plainly carries, is ſo very juſt and natural.

Beſide the Aphronitrum, however, which was only a different appearance of this body, the Greeks alſo knew another ſubſtance by that name, which was truly the froth of the liquor from which the factitious or prepar'd Nitre was procur'd; and Galen plainly diſtinguiſhing theſe, calls one of them ἀφρὸς νίτρου, and the other αφρονίτρον; his editors, indeed, not underſtanding that there could be any difference between what was expreſs'd by theſe ſo ſimilar words, have, according to the general cuſtom of editors, diſgrac'd their author, by making it ἀφρολίτρον, ἀφρονίτρου διαφέρει, inſtead of what he certainly gave it, ἀφρὸς νίτρου in two diſtinct words, ἀφρονίτρου διαφερει. It is certain that the Greeks have indifferently written this ἀφρονίτρον, and αφρολιτρον, but Galen knew the Greek Language too well to imagine the word thus differently ſpelt, two different words, the Attic dialect frequently changed the ν into λ, and that was all the difference between theſe words; which ſo accurate a writer as Galen could never have miſtaken for two different ones, or us'd as ſuch: on the contrary, his exact meaning was no more than this, that the froth of Nitre, a factitious ſubſtance, called ἄφρος νίτρου, differed from a natural ſubſtance, called by a name which might ſeem to expreſs the ſame thing ἀφρονίτρον.

This author has the merit of abſolutely diſtinguiſhing theſe too, the native and factitious ſubſtances, tho' Pliny and many others muſt be acknowledged to have confounded them.

Some have alſo been of Opinion, that our Nitre, tho' they acknowledg'd it to be abſolutely different from the ſubſtance uſually call'd Nitre by the antients, was yet known to them, and eſteem'd a ſpecies of that Salt, and have imagined the native Aphronitrum of the old authors, to have been this Salt; Salmaſius alledges the words of Pliny, *Probatio ut ſit minime ponderoſum & maxime friabile, colore plane purpureo*; which are plainly ly a tranſlation from the ἄριστος μὲν ὁ κουφότατος καὶ πλακώδης, εὔθρυπτός τὲ καὶ ἐμπόρφυρος, of Dioſcorides; the beſt is extreamly light, in form of a cruſt, eaſily broken, and of a purple colour, as a confirmation of this wild conjecture, but ſurely it will be readily allow'd, that theſe can be no evidence for it; nay, on the contrary, had that truly great critic ever ſeen the Natrum of the antients, of which this Aphronitrum was only a more lax kind, a mere accidental variety, he would have known, that inſtead of being light, friable and purple, our Nitre in compariſon of the Natrum, in compariſon with which all this was ſaid of the other, is truly very heavy, hard, and of a fine white.

SIMPLE SALTS.

ORDER II. GENUS I.

ALUMEN, ALUM.

A Salt found moſt frequently lodg'd in extreamly ſmall and diſſeminated particles, in ſtones and earths, as metals in their ores; but ſometimes alſo pure and unmixed, either in form of an efflorеſcence, or of a ſhapeleſs Salt waſhed from its ore by water, and afterwards deſerted by it.

ALUM is, in ſome parts of the world, found pure and free from all admixture, and might be eaſily miſtaken for a mere native Salt, but this is not truly the caſe; a cloſe examination, and nice enquiry, prove that all Alum is naturally immers'd in ſtones and earths, as metals in their ores, and when found thus pure, has been ſeparated from its ore by water, or a moiſt air, and was not produc'd ab origine in that form; theſe naturally pure Alums are common in ſome parts of the world, tho' with us, in a great meaſure, unknown.

This Salt, in its truly native ſtate, is contain'd in diſſeminated particles, no way diſtinguiſhable to our eyes, and only to be diſcover'd by its taſte in various other bodies, and theſe not diſtinctly of any one or two determinate kinds, but in the parts of the world where it is produc'd, it is indiſcriminately found in almoſt whatever ſtrata the earth affords, in proper ſituations, and at proper depths.

In the neighbourhood of Civita Vecchia, where the fineſt Alum is now prepar'd, it is uſually immers'd in a ſomewhat ſoft, pale colour'd ſtone, of the kind of our ordinary building ſtones, tho' ſometimes in a blue limeſtone; both theſe are found in large ſtrata in many places thereabout, but the richeſt of all its ores are the rubble ſtones of various ſpecies, and of various forms, on the ſurfaces of which it is often ſeen as an effloreſcence.

In many parts of Italy, particularly about Puteoli, earths of different ſpecies, nay, of different Genera, Marles and Clays are found impregnated with it.

In the iſlands of the Archipelago the white clays and white ſtone, no way different from our ordinary free ſtone, abound with it.

In our own kingdom, where vaſt quantities of very good Alum are made, it is found near Whitby in Yorkſhire, lodg'd ſometimes in a pale whitiſh free ſtone, ſometimes in an extreamly hard grey lime ſtone, but moſt frequently in a lime ſtone of the ſofter kind, of a blueiſh or reddiſh hue, or a mixt colour of both; but in many parts of England and Scotland it is found in a looſe black ſlaty ſtone, and the Lapis Hybernicus of the ſhops abounds with a vaſt quantity of it.

The method of ſeparating the Salt from its ores with us, is, when they are earths, by mere boiling, and when they are ſtones, by calcining firſt, and afterwards boiling, and adding to the liquor ſometimes urine, and always a fixt alkaline Salt, as Pot-aſhes, or the like.

At Solfatara and Civita Vecchia however they add no alkali, but in the firſt of theſe places the earth is boil'd in water, or the effloreſcences from it are diſſolv'd in water, and gently evaporating a part of this, the Salt cryſtallizes alone, pure and free of all mixture; and in the latter place the ſtones are calcin'd for twelve hours, and afterwards expos'd to the air, and wetted till they moulder to pieces; they are then boil'd in water, and the water left to evaporate over a gentle fire, and afterwards to cryſtalize without other admixture: The cryſtals are the Roach Alum of the ſhops.

It is eaſy to ſee from hence, that the foreign Alum is purer than the Engliſh, and tho' ours may ſerve for the Dyers, and other ſuch uſes, the foreign is much better fitted for internal uſe in medicine.

Theſe are the forms of Alum in its truly native ſtate, and theſe the methods of ſeparating it from the bodies it is immers'd in: Nature however does, in many places, the very ſame thing without our aſſiſtance as art in theſe inſtances, and gives us the Salt ſeparated from its ore in different forms.

In many parts of Italy the ſtones affording Alum are found with the Salt in ſome ſort diſlodg'd from them, and covering their ſurface in form of a ſhort and ſhapeleſs efflorеſcence, as our Pyritæ are frequently found cover'd with a vitriolick efflorеſcence of a like kind or ſhape; this, however, in both caſes, has nothing of the proper and determinate figure of the Salt in its pure cryſtals, but is merely of the figure of the pores of the ſtone out of which it has made its way; and extending to ſome length from thence, each particle, with thoſe which follow it, becomes arrang'd into a ſhort fibre; this efflorеſcence is not found in the quarries of the ſtone, but principally on the detach'd maſſes or rubble ſtones which contain Alum, and very frequently covers the whole ſurfaces of theſe.

About Solfatara, near Puteoli, a great quantity of the earth is ſo ſtrongly impregnated with Alum, that the Salt ſhews itſelf in a more firm and ſtiff efflorеſcence, covering ſometimes the whole ſurface of the ground for many acres; here it lies not in the form of a looſe ſhapeleſs maſs, but often forms moderately thick cruſts of very nearly pure Alum.

In ſome parts of Lancaſhire, and in many counties of Ireland, the black fiſſile ſtone, call'd Iriſh ſlate, ſo replete with Alum, is found with its ſurface cover'd in many places with ſmall congeries of ſomewhat flat, but extreamly fine and ſlender fibres arrang'd into ſmall maſſes, and of a greyiſh or greeniſh white. Theſe are a true Alumen Plumoſum.

In the iſlands of the Archipelago, however, pure Alum is found in the greateſt perfection; in Melo, and ſome others, on the ſhaded outſides of rocks, whoſe ſtone contains Alum, the true Alumen Plumoſum of the Ancients is found, that is to ſay, an efflorеſcence of Alum compos'd of ſtrait parallel fibres, and reſembling the Fibrariæ; the maſſes of this, in places where they have reſt and room enough to ſhoot, are found as long and twice as thick as a finger; theſe are however no more than larger ſpecimens of the ſame fibroſe efflorеſcence we find on the Iriſh ſlate, and other of our own Alum ores.

Beſide the Alumen Plumoſum, the caverns in this iſland, which are made in Alum rocks, and whoſe roofs, ſides, and floors are all of Alum ore, afford us a liquid Alum, that is, a ſtrong ſolution of Alum in water, vapours being ſent up continually from the inner parts of the earth, are condens'd in theſe caverns into drops; theſe, as they hang down from the roofs, and trickle along the ſides of the caverns, waſh off, and diſſolve the Alumen Plumoſum, or efflorеſcences of Alum, and are afterwards collected in ſmall hollows in the floor in little puddles, and are ſometimes ſo highly ſated with this Salt, as to be white and milky, and ſometimes leſs ſated, and clear as common water; in both ſtates however, the water contains a vaſt quantity of Alum in a fluid ſtate, and this is plainly enough the origin of this, by ſome ſuppos'd, native liquid Alum.

The laſt ſtate in which pure Alum is found, is in form of large maſſes of the clean Salt; theſe are of various figures, often approaching to that of the ordinary Pebbles, and ſometimes of a tolerably hard and firm, tho' oftener of a looſe and lax ſpungy texture; theſe might, above all the appearances of Alum, argue for its being found truly native; but theſe are in reality only the dry ſtate of the former appearance of this Salt, or the liquid Alum.

Theſe maſſes are no where found but in and about the mouths of the before mention'd caverns, and are only owing to the evaporation of the water which had before, from its ſolution of the Alumen Plumoſum, appear'd in the ſtate of a fluid Alum.

Theſe are the various appearances of what might be ſuppos'd native Alum, and are all plainly owing to the effects of natural ſolutions of that Salt from among the matter of its ores, in a great degree analogous to our artificial ſeparation of it, and are all the effect of ſolutions of its particles by water, or a moiſt and warm air, and of the ſeveral concretions from thoſe ſolutions.

We now know no Alum in medicine, or other common uſe but the factitious, the Antients, on the contrary, knew none but theſe naturally purify'd ones; they were upon the ſpot, or in the neighbourhood of the places where nature gave them Alum of her own ſeparation, and therefore were under no neceſſity of troubling themſelves to extract it. It has been ſuppos'd by ſome, that the Alums of the Antients were now loſt, but whoever will viſit the places from whence they had them, will find that they are ſtill in being.

They were acquainted with two kinds of liquid Alum, the one pure, the other impure; which were no other than the natural ſolutions of Alum in the caverns in the rocks of Alum ore.

The Alumen Plumoſum, which they call'd the Sciſſile, or τρίχιτης, was plainly the ſame with that ſtill found in the places where they found it. Dioſcorides was perfectly acquainted with the nature and origin of this, as well as with its ſtructure, and has excellently deſcrib'd it in a very few words; he ſays, it was made up of ſtrait filaments, and would ſplit ſingly and ſeparately into a number of capillaments, or grey ſilvery hairs; and adds, that it was only an effloreſcence of the common Alum.

After ages ſtrangely confounded this with the common greeniſh grey Amianthus, which is, to this day, commonly known in the ſhops by its name; but this Author plainly diſtinguiſhes them; he knew the Amianthus as well as we, and ſays, that in external appearance it reſembled the Plumoſe Alum, as it certainly very much does, but he adds, that the ſtone was eaſily diſtinguiſh'd from the Salt on taſting, as it had no aſtringency.

Whoever will look into the German ſhops, and into ſuch of ours as keep what they call Alumen Plumoſum, will find this Amianthus preſerv'd under its name, and even many, who have profeſſedly written of drugs, have confounded them together; who ever will conſider this, and compare it with what Dioſcorides has left us, it will appear one of thoſe inſtances in which the Antients, whom ſome are ſo fond of thinking knew nothing, really knew more than many of the Moderns in their own profeſſions.

Theſe two, the Liquid and Plumoſe Alum, with what was call'd the round Alum, were the three kinds us'd by the Antients; we have already ſeen that the former were well deſcrib'd by them, and are yet known; this laſt, or the round kind they deſcribe to have been ſometimes tolerably ſolid, and compos'd of ſeveral cruſts, but oftener of a looſe, cavernous, and ſpungy texture, and with bubbles on its ſurface: this is the ſolid ſhapeleſs Alum we now find left by the evaporation of the water, which before held the diſſolv'd Plumoſe kind in the form of liquid Alum; and this deſcription perfectly well agrees with many of the ſpecimens now found of it: Many of theſe have alſo, as before obſerv'd, the ſhape of the common Pebbles, and might thence be very naturally call'd round by the Antients.

Theſe were then the Alums of the Antients, and theſe we ſtill might have, but we have no occaſion to be ſo blindly fond of antiquity as to wiſh to employ them; ſince unqueſtionably our own ſpecies, as purify'd by art, I mean thoſe of Italy, are cleaner, and every way better than theſe were.

In whatever of theſe forms Alum is found, whether naturally pure, or in its rough ore, or purify'd by Art, when diſſolv'd, and once made into a pure Salt, it exhibits all the ſame marks and characters.

It will not run per deliquium, or melt to a fluid ſtate in a moiſt air.

It requires fifteen times its weight of water to diſſolve it perfectly, and when a proper quantity of that is evaporated, it forms octagonal cryſtals, of a ſweet, auſtere, and very ſtyptick taſte.

In the fire it pretty freely melts, and riſes into large bliſters, and when the fire is larger continu'd, becomes a looſe ſpungy light maſs, well known in the ſhops by the name of burnt Alum.

SIMPLE SALTS.

ORDER II. GENUS II.

NITRUM, Salt Petre, or the Nitre of the Moderns.

A Salt found immers'd in imperceptible particles in earthy ſubſtances, as the particles of metals in their ores, and diſcoverable in theſe bodies by an acrid taſte, and a ſenſe of coldneſs with which it affects the tongue; ſometimes alſo found native and pure, in form of an efflorescence or ſhapeleſs Salt, either on its ore, or on old walls, &c. and yielding after ſolution long, ſlender, hexaedral, priſmatic Cryſtals.

THE Nitre of the moderns is a Salt the nature of which has been much controverted, many of the more eminent writers on theſe ſubjects ſuppoſing it to be either wholly or at leaſt in part an animal Salt; and that where it is found in the earth, it is owing to the excrements of animals; and when in form of effloreſcences on old walls, that it owes its origin to the effluvia of animal bodies once inhabiting them; the greateſt quantity we have of it, however, is from the eaſtern nations, where it is found embodied in earth, as a metal in its ore, and is no way diſtinguiſhable to the ſight, till it has been ſeparated from this ſubſtance, water being its ſolvent, and doing to it what fire does to metals.

The earthy ſubſtance from which Nitre is procur'd in Perſia, is a very pale, yellow, looſe and friable body, of the nature of our European Marles. It is a moderately heavy earth, of a crumbly conſtitution and rough duſty ſurface; it does not at all adhere to the tongue, is ſomewhat hard and harſh to the touch, moulders to powder very eaſily on handling, and a little ſtains the ſkin with a yellowiſh white; it melts freely in the mouth, but leaves a conſiderable quantity of gritty particles between the teeth, and a ſtrong ſenſation of the taſte of common Salt Petre on the tongue; thrown into water it makes a ſlight ebullition, and a ſoft hiſſing noiſe, then gradually ſwells in bulk, and ſoon after falls into a number of ſmall thin flakes, and from them moulders away into a fine ſubtile powder, with ſome coarſe whitiſh grains among it, which are particles of Sand accidentally lodg'd in the maſs; this water has a ſlight taſte of Nitre, but unleſs it has ſtood ſome conſiderable time, or elſe been made hot, it does not taſte nearly ſo ſtrong of the Salt as the crude lumps of earth.

Tho' a pale yellow be the natural and genuine colour of this earth, it is ſubject to great varieties, and is from an admixture of other earth among it very often found whitiſh, ſometimes reddiſh, and not unfrequently almoſt quite black; in all theſe, however, the taſte of the nitre is leſs ſtrong than in the native yellow one, the colour'd earths here mix'd with it ſeeming a mere uſeleſs incumbrance, and the yellow in the mixture to be the only ſubſtance which contains any Nitre.

It is dug in the eaſtern parts of Perſia, and in many parts of China, and the Eaſt-Indies; and is never ſought at any depth in the earth, but always is found in form of a bare cliff, in the ſide of a hill, theſe are either broken by nature or by art, and expos'd with their bare ſurfaces to the northern or eaſtern winds. The ſame ſpecies of earth dug at any depths in the flat country, is found not to contain any Nitre, and other earths in the ſame ſituations contain no Nitre; how far this may or may not favour the ſeveral Hypotheſes of authors, particularly Hoffman and Homberg, is not the buſineſs of a work of this kind; plain-facts are here to be delivered, and theſe will always retain their value, whatever be the fate of ſyſtems form'd on them.

The method of obtaining the Salt from this earth or ore is this, they dig a large and deep pit, which they coat well on the inſide with a hard and tenacious kind of clay, this they fill half full of water, and into this they throw the earth; when this is broken and moulder'd to powder they add more water, and ſtirring all well together, they let it ſtand four or five days; after this they open a hole made in one of the ſides, or walls of the pit, which lets out all the clear water into a channel of about a foot wide, which is in the ſame manner clay'd within; thro' this it runs into another very wide and ſhallow pit, which is prepar'd in a level ground, and is ſecur'd by ſlight walls on all but the north eaſt ſide, and is open to the ſun at the top; here the water by degrees evaporates, and the Salt which it had embib'd from the earth cryſtallizes into ſmall, browniſh white, hexaedral, but uſually imperfect Cryſtals, which are preſerv'd, and are the rough Salt Petre we receive from the eaſtern nations.

This is the manufacture of the greateſt quantity of Nitre made any where in the known world, whence we may not improperly conclude this earth the moſt natural ore of this Salt; but beſide this there are many other methods of procuring it, the attempting to reaſon ſeverally on all which wou'd be the work of a ſeparate volume; the facts however are theſe.

In many of the eaſtern nations, the ruins of old buildings expos'd to the north and eaſt winds, and ſhelter'd from rain, have their walls cover'd with an efflorеſcence of a nitrous taſte; which they throw into the ſolution of the Salt from the ore, when it will no longer afford any Cryſtals of itſelf; and by this addition it becomes capable of affording a large quantity of additional Cryſtals like the firſt.

Earths moiſten'd or manur'd with the excrements of animals, as the earths of pigeon houſes and the like, all afford more or leſs Nitre; and in France vaſt quantities of this Salt are annually made by boiling in water the matter of old walls, the old plaiſter of ruin'd buildings, and the earths of ſtables and other places where animals have been fed; and Hoffman affirms, that it may be extracted at any time from the air, by expoſing an alkaline Salt to it, in a place not open to the rain or dews; and the mortar of old buildings moiſten'd with urine, and expos'd to the air in a proper ſituation, and under cover, never fails to afford Nitre after a few weeks, and that ſometimes to a tenth part of the whole quantity.

By which ever of theſe methods however it is procur'd, when refin'd by diſſolving in warm water, and re-cryſtalizing, it is ever the ſame Salt, and has all the ſame qualities and properties as well as the ſame figure.

When thus purify'd, its Cryſtals when perfect are of a hexaedral priſmatic form, terminated at their looſe end by an hexaedral pyramid; they are of a tolerably pure white, and conſiderably tranſparent; it diſſolves in a moderate fire, and if kept from coals or other extraneous matter falling into the veſſel, it remains fus'd without burning; but if any inflammable body be added to it, as if a coal fall in, or the like, it burns with a very great noiſe, and is in part converted into an alkaline Salt. It requires nearly ſeven times its own weight of water to diſſolve it perfectly, and affects the tongue with a remarkable ſenſation of coldneſs.

The uſes of this Salt in making gunpowder, and in preſerving ſubſtances, as common Salt are well known: in medicine it is greatly eſteem'd in fevers, and ſeems worthy all the regard that is paid to it in the preſent practice.

It makes a very profitable branch of commerce, and there is no doubt, but that in proper hands a manufactory of it might be ſet up and carry'd on in England with as much advantage as in Paris.

SIMPLE SALTS.

ORDER III. GENUS I.

BORAX. BORACE.

A Salt found in a fluid form, ſuſpended in large quantities in certain waters, and diſcoverable in them by a ſweetiſh mix'd with a brackiſh and bitter taſte; readily ſeperable from them by evaporation, and appearing when ſeperated in a ſolid bright and tranſparent form, and in large regularly figur'd bodies, affording on a nice ſolution and evaporation octohaedral Cryſtals.

BORAX is a Salt which very rarely comes under our cognizance, in the common manner of the ſubjects of this treatiſe, that is in form of a ſolid body, and when it does ſo the appearance is owing to accident; nature having perform'd that by means of the ſun's heat, which we do in the common way by means of fire.

In ſeveral parts of the dominions of the Great Mogul, in Perſia, in ſome parts of Tartary, and in other places in the eaſtern nations, there owzes out of the ſides of hills, in which there are the ores of ſeveral metals, but uſually of copper among the reſt; a thick turbid water of a blueiſh grey colour, ſometimes a little reddiſh, and at times greeniſh alſo, but theſe dyes are accidental, and the water in ſome places is ſeen always running without them, of its own native colour, and in others at certain times it is pure, and at others ting'd; theſe differences, however, make no eſſential difference in the liquor or in the Salt it produces. It is ever of a brackiſh, bitteriſh and very nauſeous taſte, and where it runs in ſufficient plenty, is uſually taken care of for uſe. It generally brings away with it ſome light particles of a blueiſh mud, and ſometimes has a bituminous matter ſwimming on it; and at others only a thin ſkin of many colours, like that covering the ſurface of the ſolutions of the ſeveral Salts, when evaporated to the ſtandard for cryſtallization. This water is directed in its courſe into ſeveral wide and ſhallow pits, which are firſt one and then another fill'd with it; theſe are then left to the operation of the ſun to evaporate it, but continually the people who have the care of them, are putting in large quantities of the mud depoſited by the water in its courſe, and found about the mouth of the ſpring; this they thoroughly mix in the ſeveral pits by ſtirring it about, and as the water more and more evaporates, and is ſoak'd up by this mud, the whole maſs becomes of a duſky greeniſh hue. If there has been any of the bituminous ſubſtance floating on the water, that is carefully ſkim'd off from time to time, and when the whole is now by evaporation, and by the addition of mud brought to the conſiſtence of ſoft pap, they melt very gently over the fire a large quantity of fat of any kind, and in the hotteſt time of the day throw this, while melted and flowing, to the pap; this is then thoroughly ſtirr'd together for the laſt time, and is immediately covered over with a light cruſt of dry vegetables, the ſmall branches of trees or the like, and over that is thrown a thin cruſt of any common clay; this is left quite open to the action of the Sun for ſeveral days longer; after that tryals are made about the edges to find whether it is dry; when the moiſture is judg'd to be wholly evaporated, which is uſually about ſeven or eight days after the covering up the pits, it is opened, the coat of clay now baked very hard is taken off; the boughs, &c. lifted away, and there appears a looſe, ſpungy and crumbly ſubſtance, which is broke to pieces lightly with ſpades and ſifted; the looſe powder and earthy matter readily runs thro' the ſieve, and leaves behind it the ſalt concreted from the evaporated liquor; this is what we call rough or native Borax, and is in rude and irregular maſſes, ſomewhat approaching to a priſmatick figure, very foul, earthy and fattiſh, of a duſty greeniſh colour, and of a particular rank and diſagreeable ſmell.

This is to be refin'd for uſe in Medicine, &c. and requires a treatment to this purpoſe like that of no other Salt in the world, but very analagous to that by which it was firſt cryſtalliz'd from the water into its rough ſtate, as it will not be by any art reduced to the large Cryſtals in which we find it in the ſhops, but by being covered from the external air, and kept hot all the while it is cryſtalizing; our gentle fire and the covers of our veſſels doing here what the clay cover and the Sun's heat did in its firſt formation; this proceſs only procures us a yellow and ſomewhat purer Borax, but to have it of the white colour and purity we ſee it of, it is again to be diſſolved in a Lixivium of quick Lime and Pot-aſhes, and from this mixture it ſhoots into the ſtate we ſee it in, in what we call refin'd Borax.

This is the uſual manner of procuring this Salt, but it is found in ſome places in ſmall quantities in a naturally ſolid form; the ſides of ſome of the drains it paſſes along, being encruſted with a ſhapeleſs ſubſtance of a greyiſh green, no way differing from the rough Borax, but in wanting its adventitious fattiſhneſs; and ſometimes the rocks which cover the mouths of the ſprings, have fair octohaedral Cryſtals, of a white and tolerably pure Borax; theſe are, however, accidents, and the Salt is not in either caſe naturally produced in a ſolid form, but is the effect of the Sun's heat in evaporating the water.

In which ever of theſe forms it is found, it ever gives the ſame characters, and has all the ſame qualities and properties; it requires two and twenty times its own weight of water to diſſolve it; and when nicely criſtalliz'd from this ſolution by a very gentle evaporation, and a continued heat in a proper degree, it aſſumes the figure of octohedral Cryſtals, and is white and tolerably pellucid; expos'd to the fire, it ſwells and bliſters or bubbles, and when it has ſtood ſome time in a red hot veſſel, it ſubſides into the form of a fine tranſparent white glaſs, and is then much more difficultly diſſoluble in water than before; it vitrifies all earths and ſtones mix'd with it, and expos'd to a proper degree of heat; and very greatly promotes the fuſion of metals, whence it is of uſe in ſoldering of gold, &c.

The antients us'd for this laſt purpoſe a green arenaceous powder, which they therefore called Chryſocolla, and the moderns have from this ſimilar property of Borax, called it by the ſame name, tho' no way ally'd to the ſubſtance ſo call'd by the old Authors.

Borax yields nothing by diſtillation but an inſipid phlegm.

It makes no effervescence with Acids, or with Alkalis; yet it turns ſyrup of violets green, and a ſolution of ſublimate corroſive to a reddiſh yellow, and mixed with Sal Armoniac in ſolution gives a plainly urinous ſmell; whence it is evident, that it has ſome of the properties of the Alkaline Salts, tho' it wants their great character, the fermenting with Acids; there is yet another quality in it, however, in which it approaches to the fixed Alkalis, that is, its running into glaſs with ſtones, &c. as before mention'd; to which I may add from a repeated experience, that the glaſs made by its means, is much harder and finer than that by means of ſalt of tartar; when calcin'd Cryſtal is us'd with it, the glaſs produced is little inferior to pure Cryſtal, and is not ſo ſubject to the air blebs, as they are called, as common glaſs; this vitrification is very readily made, and when continued ſome hours in fuſion, may be ting'd with cupreous and other metalline calces to all the colours of the Gems, without the help of that vaſt quantity of lead neceſſary in the common way of making the artificial Gems, which is the only thing that debaſes their hardneſs and value. Its uſes in ſoldering of gold and other metals are well known; it is of great uſe alſo in metallurgy in the remelting the ſmall maſſes of gold and ſilver that are the produce of aſſays, and rubbing it over the veſſels theſe are to be melted in with, it is of great uſe, as it fills every little cavity of them when it vitrifies in the heat, and leaves not the leaſt roughneſs on the ſurface to detain any of the melted metal; it is us'd by the dyers alſo to give a gloſs to ſilks, and in Venice and Italy the ladies uſe it as a Coſmetic; with us it is in no ſmall repute in medicine, being a ſafe Emmenagogue and great forwarder of delivery. The powder now kept ſo great a ſecret in the hands of ſome of our women midwives, is a compoſition of which this is the baſis, and the only efficacious medicine.

SIMPLE SALTS.

ORDER III. GENUS II.

HALCRYPTIUM.

A Salt found in a fluid form ſuſpended in ſmall quantities in certain waters, ſcarce diſcernible in them by its taſte, and very difficultly ſeparable from them; but by a proper evaporation, to be procured in a dry form, in extreamly ſmall particles, and in form of powder; which when carefully prepared by a proper ſolution and evaporation, affords extreamly minute, oblong, quadrangular Cryſtals.

IT has been the opinion of too many, that no Alkali Salt could be cryſtalliz'd; but this Salt, the Natrum of the antients, and the common Borax ſhew very evidently, that we ſeem yet to have had but an imperfect idea of the Alkaline Salts; the Borax ſhewing us that the ſuppos'd invariable properties of Alkaline Salts are not ſo conſtant, certain and incommunicable as it has been imagined they were; but that it is poſſible a body may be poſſeſs'd of ſome of them and not of others; that Salt turning ſyrup of violets green, and a ſolution of ſublimate yellow, and giving a urinous ſmell with Sal Armoniac, which us'd to be of the great teſts of Alkali's, yet not exhibiting their greateſt character, the fermenting with Acids; and the Natrum and this Halcryptium exhibiting all their characters and qualities, yet being by proper care reducible into regular Cryſtals.

The Halcryptium is a Salt but little known in the world, and never, ſo far as I have been able to learn, offers itſelf either naturally or by accidents to our view in the common way of Foſſils, that is, in a dry form, nor is it to be plainly diſtinguiſhed by the taſte, but is to be ſeparated by art, and by a very careful management brought from its hidden ſtate into the form of other Salts.

The waters which principally afford it are the Chalybeat ones, and I believe all of theſe have it in ſome degree; but none ſeems to contain ſo large a quantity of it as the Pyrmont, to procure it in its own form and pure ſtate from thence, a large quantity of this water muſt be gently evaporated in a broad glaſs, or glaz'd earthen veſſel, over a ſmall fire in a ſand heat; when this is reduc'd to dryneſs, there is found left a mix'd matter, compos'd of a Spar, a white marley earth, a ſmall quantity of a pale yellow ochre, and a bitteriſh brackiſh, and ſomewhat pungent Salt; the eye diſcovers the three firſt ſubſtances, the laſt is only to be found by the taſte, the quantity of the earths varies from different waters, and even in the different operations on the ſame, whether from the water at times containing different quantities, or what is much more probable, from the different degree of fire; for it would be eaſy to raiſe almoſt the whole in vapour in too great a fire; and too much caution can never be us'd in moderating it toward the end of the proceſs, to prevent the loſs of part of the ſmall remainder; the Spar ſeems however much the ſame in quantity in different careful tryals, and the ſaline matter wholly the ſame.

The Reſiduum being taken out of the veſſel, muſt be ground to a fine powder in a glaſs mortar, and mix'd by degrees with a ſmall quantity of diſtill'd common water; the whole, tho' before ſuſpended in a pellucid water, will now no longer mix with that menſtruum, but is a thick turbid yellowiſh white mixture, which muſt be filtrated; the clear liquor being now evaporated to a dryneſs, affords a browniſh white Salt, very much reſembling Salt of Tartar, but inſtead of this it ſhould be evaporated only to a pellicle, and then being ſet by for a few hours, the ſides of the glaſs will be found encruſted with a ſort of ring of a whitiſh matter, marking the ſurface of the liquor; this is of a very pungent taſte, and being examin'd by the Microſcope, ſhews many perfect and pure cryſtals of a regular figure, being all quadrilateral columns terminated by ſhort quadrilateral pyramids; but few of theſe are quite perfect, moſt being mutilated or blended in their concretions among one another at the ſides of the glaſs, and lower down, there are uſually found ſome cryſtals of common marine Salt, of their uſual forms, but very ſmall.

The Halcryptium thus ſeparated has all the properties of the common alkaline Salts; mix'd with an acid it efferveſces and produces a neutral Salt; it turns ſyrup of violets green, and precipitates a yellow powder from a ſolution of corroſive ſublimate in water, and mix'd with a ſolution of Sal Armoniac a urinous ſmell is produc'd.

This Salt ſeems of the utmoſt importance to the water from which it is obtain'd, ſince it can be ſuppos'd to contain no other alkali, and without an alkali it is not eaſy to account for its properties; and by means of common alkali of Tartar, and a ſolution of the Pyrites, or even of iron in an acid mix'd with common water, a liquor may be made very much reſembling the natural Pyrmont water.

THE

THE HISTORY OF FOSSILS.

PART the First.

BOOK III.

FOSSILS naturally and eſſentially ſimple, not ſoluble in water; inflammable.

Series the firſt.

Simple, inflammable Foſſils, of a ſolid form.
Of this Series there are two Claſſes.

The firſt is of thoſe which are of a purer texture, and in ſome degree pellucid. *The* PHLOGIDIAUGIA.

The ſecond of thoſe which are of a coarſe and more impure texture, and not pellucid. *The* PHLOGISCIERIA.

Series the firſt.

Claſs the firſt.

PHLOGIDIAUGIA.

Tranſparent inflammable bodies.

Of this Claſs there are two Orders, and under thoſe four Genera.

Order the firſt.

Phlogidiaugia, of a lax texture, ſoft and friable.

Order the ſecond.

Phlogidiaugia, of a finer texture, and conſiderably hard.

PHLOGIDIAUGIA.

Order the firſt.

Genus I. SULPHURA. *Sulphurs, dry, ſolid, but friable Foſſils, of a plain and ſimple ſtructure; melting with a ſmall heat: when fired in the open air, burning almoſt wholly away, emiting*

emiting a blue flame and a ſtrong ſmell of a ſubtil penetrating acid nature, provoking to cough, and very hurtful to the lungs; endued with the electric power of amber, and not diſſoluble in acids.

Genus 2. AURIPIGMENTA. *Orpiments. Inflammable foſſile ſubſtances, compos'd of numbers of thin flakes like the Talcs, which eaſily ſplit and are ſeparated from one another, and are flexile but not elaſtick; ſoluble in oil, fuſible in a moderate fire, inflammable, and yielding in burning an offenſive ſmell, like that of Garlick.*

PHLODIGIAUGIA.

Order the ſecond.

Genus 1. ZARNICHIA. *Zarnicks. Inflammable foſſile ſubſtances, not compos'd of plates or flakes, but of a plain, ſimple, and uniform ſtructure, not flexile nor elaſtick, ſoluble in oil, and burning with a whitiſh flame, and fetid ſmell like Garlick.*

Genus 2. SUCCINUM. *Amber. An inflammable foſſile ſubſtance, dry, hard, and very pellucid, not compos'd of flakes or of any other viſible Moleculæ, but of one pure uniform ſtructure, fuſible in a ſtrong fire, of a bituminous and ſubaſtringent taſte, of a fragrant ſmell when rubb'd, and indued in a very high degree with a property called from its name Electrum, Electricity.*

SERIES I.

CLASS I. ORDER I. GENUS I.

SULPHURA, SULPHURS.

Dry, ſolid, but friable foſſile bodies, melting with a ſmall heat, when fir'd in the open air burning almoſt wholly away with a blue flame, and noxious vapour; endued with an electrick power, and not diſſoluble in acids.

1. *Sulphur flaveſcens.*
Yellow Sulphur.

THIS is a very fine and beautiful ſubſtance, and is the moſt pure of all the Sulphurs; it is of an extreamly ſmooth and even texture, of an unequal and irregular but not rough or harſh ſurface; very ſmooth and ſoft to the touch, and of a perfectly uncertain figure, being found in maſſes of all ſhapes, but ſeldom much approaching to roundneſs, and of different ſizes, from the bigneſs of a horſebean to three or four inches in diameter; it is moderately bright on its ſurface, and breaks eaſily between the fingers, ſhewing a very delicately even and regular ſtructure where broken, and a very ſmooth, bright and gloſſy ſurface; it is of a very agreeable pale yellow, and as tranſparent as the pureſt Amber.

This is the genuine and natural appearance of native yellow Sulphur when quite pure, and in this ſtate it is not unfrequently found; more often, however, it is met with in larger and ruder maſſes, and wanting conſiderably of this purity, and debas'd by coarſer particles; in this caſe it is uſually of a more irregular and rugged ſurface, of a more rare and lax texture, often cavernous and ſpungy, and more opake; tho' ſtill, when held up againſt the light in pieces not too thick, it is in ſome degree tranſparent; and in this ſtate is commonly of a paler yellow, looking as if it had ſome admixture of whiteneſs, and ſometimes is ting'd with a greyiſh caſt, or with a faint reddiſh brown; not unfrequently ſpecimens are found partly of this impure, and partly of the more pure and perfect kind; what has been the upper ſurface of the maſs uſually being the fineſt, and the loweſt the moſt coarſe, the middle of the lumps being of a middle degree of purity between theſe. Some ſpecimens I have of it are of a rude and coarſe bottom, and have the pure, fine and pellucid Sulphur, ſhot at the top into a congeries of ſmall variouſly figur'd maſſes; the Sulphur in all theſe ſtates is the ſame ſpecies of body, and exhibits all the ſame characters.

It is not hard enough to give fire with ſteel.

It makes not the leaſt effervſcence in acid Menſtruums.

Examin'd by the Microſcope, it appears in the purer ſpecimens one pure and perfect homogene maſs, reſembling a colour'd Cryſtal; in the others, the ſtructure is conſiderably injured by the impurity, but even in the coarſeſt pieces there is much brightneſs and a conſiderable degree of tranſparence.

It very readily melts with a ſmall fire, running like water, and looking while melted of a reddiſh hue; if ſet on fire, it burns over the whole ſurface with a very deep blue flame, the maſs at bottom remaining very thin and fluid; when it goes out, it may be lighted again, and by repeating this will burn wholly away in the pureſt ſpecimens, without leaving any the leaſt remainder; keeping the ſame equable and ſteady flame to the laſt, and the melted maſs under the flame never ſwelling or bubbling in the leaſt.

It is found in the greateſt purity in the gold mines of Quito in Peru, tho' there in no great quantities; but the gold mines in Hungary produce it in conſiderable abundance.

It is alſo ſometimes found about the burning mountains Ætna and Veſuvius, and ſometimes hangs from the rocks on their ſides in form of Icicles or Stalactitæ; but in this caſe, it ſeems to have been influenced in ſome degree in its figure by fire.

There is alſo another ſtate in which it ſometimes appears, which is in form of a fine yellow powder on the ſtones and boards about the waters of Aix la Chapelle, and ſome other ſulphureous ſprings; in this ſtate it much reſembles the common flower of brimſtone.

This, were it to be had in ſufficient plenty, muſt be of all Sulphurs the moſt valuable for medicinal uſe.

2. *Sulphur vireſcens.*
Greeniſh Sulphur.

This is an extreamly beautiful and curious Foſſil; it is a denſe, hard, firm and compact ſubſtance, of a cloſe, even and regular texture; very remarkably heavy, and uſually of a very ſmooth, even and gloſſy ſurface; of a conſiderably ſtrong ſmell, and ſoft and ſmooth to the touch; it is of an irregular and indeterminate figure, and often flat and in broad cakes, tho' ſometimes approaching to round; it is ſeldom of the ſame plain and even internal ſtructure with the yellow kind, but uſually is compos'd of ſeveral ſtrata or different layers of matter, and ſometimes of regular cruſts encloſing a Nucleus as in the Pebbles: it is found in maſſes of various ſizes, from one inch to ſix in diameter; and is of a ſomewhat duſky yet pale greeniſh colour, with more or leſs admixture of yellow; it is very hard, and when broken ſhews an even and tolerably gloſſy ſurface, but has even in the thinneſt pieces very little tranſparence; it has been before obſerv'd, that the yellow Sulphur is at times found ting'd with a greeniſh caſt, but the weight, hardneſs, opacity, inner ſtructure, and other properties of this evidently diſtinguiſh it from ſuch accidental tinges of that ſpecies.

It is not hard enough to give fire with ſteel.

It makes no effervſcence with Acids.

Examin'd by the Microſcope, it appears of a cloſe, compact and even texture, and very conſiderably gloſſy, tho' not tranſparent; it melts pretty readily in the fire, flowing to a thin fluid maſs of a tolerably bright and ſtrong red while in fuſion, but returning to its native green when cold; if ſet on fire, it burns over the whole ſurface with a ſomewhat paler blue flame than the pure yellow kind, and has a few ſlight bubbles on the top, with ſome few ignited or red hot ſpecks in different parts; when the flame goes out, it may be again ſet on fire; and if this be repeated till it will burn no more, a ſmall quantity of pale red aſhes will be found left, which are of a ſaline and ſtyptick taſte, and make no effervſcence with Acids; the flame toward the end of this proceſs vibrates, and plays alſo very briſkly over the ſurface with a cracking noiſe.

It is found on the ſides of mount Veſuvius, and in no other place ſo far as is yet known; none of it having been found about mount Ætna, tho' carefully ſought after in the neighbourhood of that place.

This ſeems not ſo proper for internal uſe as the yellow kind, but for diſtilling the acid ſpirit, or oil of Sulphur by the bell, as it is call'd, wou'd be better than any other kind, if it were to be had in ſufficient quantity.

Theſe ſpecies are very ſeldom ſeen in the ſhops.

3. *Sulphur cinereum.*
Grey Sulphur.

This is a very poor, coarſe and rude kind of Sulphur, but is what is commonly us'd in the ſhops of London and Germany, under the name of Sulphur vivum, or native Sulphur; it is a very impure ſubſtance, of a rough, coarſe and irregular texture, conſiderably heavy, and of a very unequal and rugged ſurface; it feels however, ſomewhat ſoft to the touch, and is of a moderately ſtrong ſulphureous ſmell. It is of no determinate or regular figure, but is ſometimes found in irregularly roundiſh, tho' more frequently in flat maſſes, of various ſizes, from an inch to two foot or more in diameter, and ſometimes conſtitutes whole ſtrata of conſiderable thickneſs; it is of an extreamly irregular and unequal ſtructure, being very lax and ſpungy in ſome parts, and more compact and firm in others; and is of a dull and duſky greyiſh colour, made of a mixture of white and blue; ſometimes theſe are ſo perfectly and evenly mix'd as to make one uniform colour, but more frequently there are in it blotches and veins of a duſky white and a pale greyiſh blue, ſeperate and diſtinct from one another; but in which ever of theſe ſtates it is found there are almoſt ever ſome ſtreaks or ſpots of a pale yellow alſo in it; it is conſiderably hard, eſpecially when it has lain ſometime in the air, and breaks with a rude, irregular, and ſcarce at all gloſſy ſurface, and has no tranſparence even in the thinneſt pieces.

It is not hard enough to give fire with ſteel.

It does not make the leaſt efferveſcence with Aqua Fortis.

Examin'd by the Microſcope, its ſtructure is plainly ſeen to be that of a mere marly earth, harden'd by the admixture of a large quantity of ſulphureous matter, which has been very evenly and equally blended through it, and ſerves as a cement to its other laxer parts.

It melts leſs readily than any other Sulphur, and does not run like the purer kinds into a fine thin fluid, but boils and bubbles up very high in the veſſel, and looks like a dirty opake maſs of boiling matter.

If ſet on fire it yields a very deep blue flame, but does not run clear and fluid under it, but boils up in the like bubbles, and appears ignited or red hot in many parts of the maſs, and finally leaves a very large quantity of blackiſh aſhes, which have a ſaline taſte, but make no effervescence with Acids.

It is very common in Iſland near the mountain Hecla, and is alſo dug in great abundance in many parts of Italy.

It is us'd under the name of crude Sulphur in our ſhops, and in Italy where it is moſt plentiful is melted for the Sulphur it contains, which eaſily runs pure from it.

4. *Sulphur rubrum.*
Red Sulphur.

This is the moſt rare and moſt beautiful of all the ſpecies of Sulphur. It is a very fine, even and compact ſubſtance, of a cloſe and firm texture, and very remarkably heavy; it has leſs of the offenſive ſmell of Sulphur than any other kind, and is of a naturally even and gloſſy ſurface, and very ſmooth to the touch: It is of no determinate or regular figure, but is found in maſſes of from half an inch to three inches in diameter, ſometimes broad and flat, but more uſually roundiſh or irregularly thick; its inner ſtructure is perfectly ſmooth, even and regular, it is very hard, but breaks with a ſmooth and gloſſy ſurface, and is throughout of a fine and equal glowing red, like that of the fineſt native Cinnabar, and is very elegantly bright and tranſparent; this is its moſt pure, and indeed its moſt uſual ſtate, but like the yellow kind it is ſubject to be ſometimes more foul, and degenerates into a laxer texture and paler colour.

It is not hard enough to give fire with ſteel.

It makes no effervescence with Aqua Fortis.

Examin'd by the Microſcope, it is a very glorious object, it is ſeen to be of one pure and equal texture throughout, of a fine glowing red, of great brightneſs and a fine tranſparence; it melts more ſlowly than any other ſpecies of native Sulphur, and runs into a ſmooth and even but not very thin body, bubbling a little on the ſurface, but of a fine, clear, deep red throughout, and emitting beſide the ſulphureous ſmell, a very diſagreeable one like that of Garlick, plainly owing to an admixture of arſenical particles which it has received at its concretion, and to which poſſibly it may owe its colour; when ſet on fire it emits a yet ſtronger ſmell.

It burns with a very bright blue flame, and boils or bubbles up a little underneath; when burnt away it leaves a ſmall reſiduum of a fine deep red powder of a ſaline taſte.

It is a very ſcarce as well as a very elegant Foſſil, being found only in the gold mines of Peru, ſo far as is yet known. It has been ſuppos'd to contain gold, but I have been at the pains of aſſaying a part of my ſpecimen of it, without being able to ſeperate any the leaſt particle of that metal.

It is the leaſt fit of all the kinds for internal uſe, as plainly containing ſome arſenical particles.

Theſe are the ſeveral kinds of native or crude Sulphur, the firſt of which wou'd be of almoſt ineſtimable value in medicine if it cou'd be had in ſufficient quantities; but the grey kind is from its commonneſs and cheapneſs what is principally us'd; the common Brimſtone is not much different from theſe, however, and is prepar'd by fuſion, either from the grey native kind, tho' that but in ſmall quantities, and little of it is brought to us; or from the common vitriolick Pyrites, whence vaſt quantities are yearly made in Saxony, and tranſported into all parts of Europe.

Simple inflammable Foſſils.

SERIES I.

CLASS I. ORDER I. GENUS II.

AURIPIGMENTA. ORPIMENTS.

Inflammable foſſile ſubſtances, compos'd of numbers of thin flakes like the Talcs, which eaſily ſplit, and are ſeparated from one another, and are flexile but not elaſtick; ſoluble in oil, fuſible in a moderate fire, inflammable and yielding in burning an offenſive ſmell, like that of Garlick.

Theſe are like the Talcs alſo in ſome ſpecies compos'd of large plates or flakes, each making the whole ſurface of the maſs, and in others compos'd of ſmall flakes in form of Spangles.

1. *Auripigmentum aureum, ſquammis latiſſimis.* *Broad-flak'd, gold colour'd Orpiment.*

THIS is an extreamly elegant Foſſil, and has been well known and much eſteem'd in all ages; we have plain proof from Dioſcorides, who has excellently deſcrib'd this very ſpecies, that the antients had it in great eſteem, and our modern painters know its value at preſent as well as it ever was known.

It is a very regular, bright and beautiful ſubſtance, of a perfectly fine and pure texture, and very remarkably heavy. It is of a ſmooth, bright and gloſſy ſurface, and is very ſoft to the touch; it is found in maſſes of no determinate figure, but always broad and flat, theſe are of no regular ſize, but are met with from half an inch to three inches over, tho' they rarely exceed an inch in thickneſs in the largeſt lumps. Theſe are perfectly pure and homogene, they are ever found looſe and detach'd from all other ſubſtances, and never contain any foreign admixture of earth, or any other foulneſs in them; they are of a beautifully regular ſtructure, compos'd of a multitude of thin ſcales or flakes, exactly reſembling thoſe of the Speculares or broad-flak'd foliaceous Talcs; and as in thoſe bodies ſo in this ſpecies of Orpiment, one flake always makes up the whole ſurface, but they are here not always ſtrait, but ſometimes undulated, bent and inflected. Theſe may be parted to an extream fineneſs like the flakes of the Talc, but they are, tho' very flexile, not at all elaſtick, being eaſily bent into any poſture, and always remaining in it; whereas elaſticity is the great diſtinguiſhing character of the Talcs; hence appears the error of thoſe who ſuppos'd Orpiment to be Talc accidentally ſtain'd. It is of an extreamly bright and beautiful yellow, not pale but very much the colour of the deeper gold; it is not hard but very tough, eaſily bending without breaking, and when ſplit it affords an extreamly bright and beautiful ſurface, and is in thin pieces beautifully tranſparent.

It makes no efferveſcence with Aqua Fortis.

It is not hard enough for the teſt by ſteel.

Examin'd by the Microſcope, it appears one pure homogene ſubſtance, diviſible into plates of extream thinneſs, and of a beautiful colour, brightneſs and tranſparence.

It readily melts with a ſmall fire, and runs into a red fluid maſs as thin as water, the Sulphurs appear red while in fuſion, but recover their native yellowneſs when cold again; but this never loſes the redneſs it thus gains, but continues of a fine red, and is then the factitious Sandarach.

If ſet on fire it burns very freely, emiting a ſtrong ſmell like that of garlick, and giving a pale whitiſh flame, with an admixture of a blueiſh green at the edges; and the fluid maſs below retains a perfectly ſmooth and equal ſurface, never bubbling or boiling up; when it goes out it may be lighted again, and will finally burn all way without leaving the leaſt remainder.

It is found in the iſlands of the Archipelago, in the mines of Goſſelaer in Saxony, in ſome parts of Turky and the Eaſt-Indies; the fineſt now known in the world is about Smyrna, where it is not well known of, but might make a very advantageous branch of commerce.

It is ſometimes ting'd with an admixture of red Orpiment, and makes with it a very beautiful figure; it makes the fineſt of all yellows in painting.

2. *Auripigmentum flaveſcens, ſquammis minoribus.*
Small-flak'd, yellow Orpiment.

This is the common Orpiment of the ſhops, and tho' greatly inferior to the laſt ſpecies, is yet a very fine colour. As that reſembles in texture the Speculares or broad flak'd Talcs, ſo this does the Bractearia or ſpangled ones; and its flakes are uſually lodg'd, like the ſpangles of thoſe bodies, in an impure and irregular ſubſtance, of a coarſer nature than Orpiment, and not foliaceous or flaky; theſe and the maſs they are lodg'd in, have been uſually look'd upon as one ſubſtance, however, and the whole powder'd together for uſe; but the matter the flakes are lodg'd in, tho' uſually call'd alſo Orpiment, has not the characters of that body, being neither flexile nor foliaceous, but is properly a green ſubſtance of the nature of Sandarach, tho' leſs pure; tho' theſe bodies have all been hitherto call'd Orpiment, the Sandarach itſelf being call'd red Orpiment, the more accurate diſtinctions of the Genera of Foſſils will not permit theſe ſubſtances now being call'd by that name, but determine them a ſeparate Genus, next to be deſcrib'd under the name of Zarnichs, a word us'd indiſcriminately by the Arabian Phyſicians indeed for theſe, and all the other Orpiments, of whatever figure or colour.

The flaky ſpangles in theſe maſſes, which alone are true Orpiment, are of a very fine and pure texture, conſiderably heavy, of very ſmooth, polite, and gloſſy ſurfaces, and very ſoft and ſmooth to the touch; they are perfectly irregular in ſize and figure, and are many of them ſo large as to emulate the appearance of the large flak'd Orpiment when taken out of the maſs; they are uſually, however, much ſmaller, the fifth or ſixth part of an inch being their moſt uſual diameter; they are often of a longiſh figure, tho' very frequently as broad as long, and are of a pale but bright yellow in different degrees; tho' their external appearance does not diſtinguiſh them however from ſmall flakes of the broad flak'd kind, their internal ſtructure and qualities do; they are very eaſily fiſſile, like that, into thin flakes, but there is in theſe a degree beyond which we cannot go; the thinneſt flakes we can ſplit theſe into, not appearing any farther fiſſile, whereas thoſe of the broad flak'd kind, even in their thinneſt pieces, are ſeen yet fiſſile into multitudes of others, if we had eyes and inſtruments to do it; theſe flakes are very flexile, but leſs ſo than thoſe of the other kind, much more readily breaking in the attempt to bend them; they are not at all elaſtic, and in thin pieces are very tranſparent.

They make no efferveſcence with Aqua Fortis.

Examin'd by the Microſcope, they are ſeen to be of an extreamly even and pure ſtructure, and great brightneſs.

They readily melt, running into a fluid maſs with a very ſmall fire, and looking of a fine florid red while melting, which colour they retain when cold; if ſet on fire they burn with a greeniſh white flame, and finally leave a ſmall quantity of whitiſh aſhes of a ſaline taſte, which make no efferveſcence with acids.

Theſe flakes, which are the true and genuine Orpiment, are lodg'd indiſcriminately in all the ſpecies of Zarnich, except the red, tho' but very rarely in the orange colour'd; and as they are in larger quantities in them, make the whole the more or leſs valuable, from ſix-pence, or leſs, a pound, to a ſhilling an ounce; the whole is always powder'd together under the name of Orpiment, and is of a more or leſs lively colour, as there is more or leſs genuine Orpiment in it; the Zarnich itſelf being of a dead and diſagreeable hue in the common greeniſh and white kinds; but in the yellow the whole is very valuable, but that is very ſcarce.

It is dug in many parts of the Turkiſh dominions, in the iſlands of the Archipelago, and in ſome parts of Germany; in Germany it is generally lodg'd in the greeniſh Zarnich; in Turkey often in the greeniſh, but ſometimes in the orange colour'd; and in the iſles of the Archipelago very often in the white, which is a very curious Foſſil, tho' the leaſt valuable of them all.

3. *Auripigmentum Cinnabarinum.*
Red Orpiment.

Red Orpiment has been a name uſually given by the more judicious to Sandarach, or the red Zarnich hereafter to be deſcrib'd, and by the vulgar to red Arſenic.

The ſubſtances of the Orpiment and Arſenical kind, have been indeed ſo unhappily confounded by the generality of the world, that there has been no ſmall merit in the authors who have made the diſtinctions between red Arſenic, which is a factitious ſubſtance, and Sandarach, which is a native mineral, and diſtinguiſh'd the laſt from the former by the name of red Orpiment: This ſubſtance, however, as before obſerv'd, is not properly an Orpiment, being not flexile, nor of a foliaceous texture, and the more determinate arrangements of Foſſils oblige us to exclude it from this Genus, and from the name of red Orpiment; for tho' red Orpiment and Sandarach have been look'd on, even by the judicious, as ſynonymous words, yet there is abſolutely a genuine and true Orpiment of a red colour, eſſentially different from Sandarach, which is a Zarnich to be deſcrib'd in this place.

This genuine and proper red Orpiment is a very elegant and beautiful ſubſtance, but is ever found in form of ſpangles, not of large flakes, and ſcarce ever pure or looſe, being almoſt always lodg'd either in a yellow or greeniſh Zarnich, or tho' that more rarely in the very ſubſtance of the pureſt yellow Orpiment, inſinuating its ſmall flakes between thoſe of the yellow; it is of a very remarkably pure and fine texture, extreamly heavy, and of an irregularly ridg'd ſurface, being ſcarce ever found flat, even, and plain, as the yellow Orpiment; it is of a very irregular and indeterminate figure, and as uncertain in ſize; its flakes are uſually ſhort, and of a figure nearer ſquare than long, but perfectly irregular, and are uſually ſmall, ſeldom exceeding one tenth of an inch in diameter, tho' ſometimes, in very fine ſpecimens, they are ſeen near half an inch broad; they are uſually bent and uneven, and appear irregularly ridg'd on their ſurfaces, and of a very bright ſparkling hue, when broken tranſverſely; they are eaſily fiſſile, but that only to a certain degree, and not into very fine or thin flakes; and theſe are but ſlightly flexile, and not at all elaſtic; they are indeed the brittleſt of all the Orpiments, and uſually ſnap in the attempting to bend them; they are of an extreamly bright and beautiful red, reſembling more than any other ſubſtance the colour of Cinnabar, and having much of the look of ſome of the brighter native Cinnabars; they are very remarkably bright and gloſſy, but very little tranſparent.

They are too ſoft for tryals by ſteel.

They make no efferveſcence with Aqua Fortis.

Examin'd by the Microſcope, they appear a very bright and beautiful object, of a fine, even, and regular ſtructure, and a gay glowing colour, but very ſlightly pellucid.

They readily melt over a gentle fire, running into a fine fluid maſs of a deeper red, which colour the whole retains when cold; if ſet on fire, it burns with a very bright and vivid greeniſh white flame, and a ſtrong garlick-like ſmell, and finally leaves a ſmall quantity of greyiſh aſhes, which taſte very brackiſh and ſaline, but make no efferveſcence with Aqua Fortis.

It is found in the Turkiſh dominions, and in the iſlands of the Archipelago, nor is our own country without it, for I have lately receiv'd a very fine ſpecimen of it from the tin mines of Cornwall, under the name of red Mundick, every thing that is bright and ſparkling being there call'd by that name; it is uſually lodg'd in the green Zarnich, ſometimes in but ſmall quantities, ſometimes in much larger; and in the iſlands of the Archipelago is ſometimes, tho' very rarely, found in pure maſſes compos'd of multitudes of ſpangles blended together in all directions without the intervention of any other ſubſtance.

When pure it would doubtleſs make a very beautiful colour, but in its common ſtate of mixture with the green Zarnich, it is of little value.

Theſe are the ſpecies of genuine Orpiment known at preſent in the world, for I am not, according to the common cuſtom, accounting Sandarach of that number; the confounding theſe two ſubſtances under the ſame denomination, is indeed an error of late ages, the Antients, who knew both Orpiment and Sandarach very well, never calling them by the ſame name; and Dioſcorides allotting them two ſeparate chapters: What may therefore appear a new diſcovery in regard to theſe bodies at this time, and ſet right their true nature and diſtinctions, was indeed well known to the Antients; and the great misfortune is, that the later writers, even thoſe of greateſt repute, have not taken the pains of enquiring thoroughly into the writings of the Antients, or of comparing their accounts with the bodies themſelves; the late eminent Geoffroy ſays, *Quid ſit Auripigmentum alterum Dioſcoridis balanoides pallidum, colore Sandarachum imitans & gleboſum, ignoramus*; yet this very kind is evidently the red Orpiment, deſcrib'd in this place. Dioſcorides's account of Orpiment is indeed an excellent one; he ſays, the fineſt is cruſtaceous or foliaceous, and reſembles gold in colour, having its cruſts laid evenly and regularly on one another; and adds, that this kind is free from admixtures of any foreign matter; there can be no doubt but that this was the fine, large, flaked Orpiment firſt deſcrib'd; the other, he ſays, was form'd into irregular glebes in figure reſembling the lumps of Ochre, and in colour approaching to Sandarach; this is the ſpecies declar'd unknown to us by Geoffroy, but is plainly this above deſcrib'd; ſo that a red Orpiment, different from Sandarach, tho' it might ſeem a new diſcovery now, is really a ſubſtance known as early as in the days of Dioſcorides; and ſuppoſing that author to have had before him ſome of the pure ſpecimens, where the flakes are not immers'd in the Zarnich, but make up of themſelves the whole maſs, it is not eaſy to contrive in ſo few words a better deſcription.

Simple inflammable Foſſils.

SERIES I.

CLASS I. ORDER II. GENUS I.

ZARNICHIA, ZARNICHS.

Inflammable Foſſile ſubſtances, not compos'd of plates or flakes, but of a plain, ſimple and uniform ſtructure, not flexile nor elaſtic, ſoluble in oil, and burning with a whitiſh flame, and noxious ſmell like that of Garlick.

1. *Zarnichium floride rubens; quæ Sandaracha authorum.* *Bright red Zarnich, the Sandarach of Authors.*

THIS is an extreamly beautiful and elegant Foſſil, of a fine, even and compact texture, and very remarkably heavy; it is of a bright glittering ſurface, very ſmooth and ſoft to the touch, and very indeterminate in ſhape and ſize, being found of all figures, but moſt uſually ſomewhat flat, and with irregular and rugged edges, and in ſize from maſſes of an ounce to thoſe of twenty pound weight; its internal ſtructure is equal and homogene without any appearance of plates or flakes, and its colour a very bright and glorious red, approaching to that of the fineſt native Cinnabar; it is moderately hard, and breaks with a very even gloſſy ſurface, and is very bright and tranſparent even in large and thick pieces.

It will not ferment with Aqua Fortis.

Examin'd by the Microſcope, it appears of a pure homogene ſtructure, but of an undulated not perfectly flat ſurface, and uſually ſhews in different parts two or three different degrees of red; it very freely melts, and runs into a fluid maſs like water, with a ſmall degree of fire; if ſet on fire, it emits a fine vivid white flame, with ſome faint admixture of greeniſh about the edges, and has a ſtrong ſmell of Garlick, with a very copious ſmoak; if kindled again as often as it goes out, it finally burns all away without leaving the leaſt remainder.

It is found about the copper mines in Germany, and ſometimes is imported from the Turkiſh dominions: It makes a very beautiful red in painting.

2. *Zarnichium flavum.*
Yellow Zarnich.

This is a ſubſtance little inferior to the former in beauty, and tho' unknown by name, is not a little valued by the painters, who eſteem it a very valuable kind of Orpiment; it is a very pure tho' irregularly conſtructed ſubſtance, of a looſe and friable texture; very heavy, and of a rugged and unequal ſurface, yet ſomewhat ſmooth and ſoft to the touch. It is very indeterminate both in ſhape and ſize, being found of all figures, but generally rudely approaching to round, ſeldom much flatted, and in maſſes from one inch to ſix or eight in diameter; its internal ſtructure is not in the leaſt foliaceous or flaky, but it is made up of a number of ſmall concretions of no determinate figure, rudely and irregularly blended together; it is of a fine ſtrong yellow, moſt commonly ſomewhat approaching to orange colour, and is very ſoft and friable, breaking with a moderately bright ſurface, but having but little tranſparence.

It makes no effervеſcence with Aqua Fortis.

Examin'd by the Microſcope, it appears of a plain and ſimple ſtructure, moderately bright, and a little pellucid: It readily melts, running into a thin fluid like water over a ſmall fire; this is not only red while over the fire, but retains that colour when cold; if ſet on fire it burns briſkly with a whitiſh green flame, and leaves at laſt a ſmall quantity of red aſhes which taſte brackiſh and ſaline.

It makes no effervеſcence with Aqua Fortis.

Its ſeparated particles, when as thin as they can be procured, are not at all flexile, but extreamly friable.

It is found in the mines of Germany, and is brought over to England under the name of Orpiment; it is a very fine colour, and has very frequently ſpangles of the common yellow ſmall ſpangled Orpiment immers'd in it in conſiderable quantities.

3. *Zarnichium vireſcens.*
Greeniſh Zarnich.

This is a very coarſe and impure ſubſtance, and greatly inferior to the two former in beauty as well as in value; it is an irregularly conſtructed ſubſtance, of a ſomewhat lax and friable texture, and of very remarkable weight. It is of a rude, rugged and irregular ſurface, and almoſt always contains in it ſeveral ſpangles of the common yellow ſmall flaked Orpiment; it is very indeterminate in ſhape and ſize, being found in all figures and in maſſes from half an ounce to eight or ten pound in weight; it is of an obſcure and duſky hue, and conſiderably hard, and of an irregular rough ſurface; when broken, it is of a pale diſagreeable greeniſh colour, and with but little brightneſs or tranſparence.

It will not ferment with Aqua Fortis.

Examin'd by the Microſcope, it appears of a ſomewhat crumbly texture, and is very faintly pellucid even in the thinneſt pieces.

It does not melt ſo readily as the red and yellow kinds, but requires a ſtronger fire, and uſually takes fire, and flames before it fuſes, and in the more impure maſſes will not regularly melt at all, in the pureſt its ſurface is ſeen covered with a very bright and vivid green flame, and the maſs below not equally or perfectly fluid, but boiling and bubbling up, and looking of a coarſe greyiſh colour in ſome places, and of a firey red in others, being in theſe laſt really ignited; it does not burn long, and leaves a large quantity of pale red aſhes, which have a brackiſh taſte.

It will not ferment with Aqua Fortis.

In the burning it emits a very diſagreeable ſmell like Garlick.

It is very common in the German mines, and in thoſe of Cornwall, and ſome other parts of our own kingdom; it is ſold in the colour ſhops under the name of the coarſer Orpiment, but is of little value; the more flakes of Orpiment it contains, the more it is eſteem'd.

It ſeems always to carry ſome portion of ſtony matter with it, and in ſome ſpecimens is almoſt wholly ſtoney, ſo as ſcarce to deſerve the name of a Zarnich.

4. *Zarnichium albeſcens.*
Whitiſh Zarnich.

This is a very foul, coarſe and opake ſubſtance for a body of this Genus; it is of a coarſe irregular texture, very heavy, and of an extreamly rough and rugged ſurface, and uſually very much ſpangled with flakes of the ſmall ſcaled yellow Orpiment; it is very irregular in ſhape, ſometimes ſomewhat flatted, but often rounded, and as thick as broad, but is never found in large maſſes, three or four inches being the utmoſt diameter it is known to arrive at; its ſurface is very rude and unequal, and has very little brightneſs, except what it owes to the ſpangles of Orpiment immers'd in it, and is of a duſky greyiſh white, with very little tranſparence even in the ſmalleſt pieces.

It makes no effervеſcence with Aqua Fortis.

Examin'd by the Microſcope, it appears of a very irregular but a ſomewhat bright ſurface, and in thin pieces is a little pellucid.

It does not readily melt, but with a ſtrong fire runs into an irregular maſs boiling and bubbling up, and emits a fine pale green flame, with a very ſtrong ſmell like that of Garlick, and leaves a reſiduum in conſiderably large quantity in form of pale red aſhes.

It is ſubject like the former, to be highly debas'd with a mixture of ſtony matter, but while tolerably pure, has a property not known in any other natural or factitious ſubſtance; which is, that its natural effluvia turn black ink red; this was diſcovered to me by an accident, and ſeems not equally to reſide in all parts of the ſame maſſes, the ſmall paper affix'd on the ſpecimens I preſerv'd of it, having the figures it was mark'd with gradually turn'd from black to a faint red; this was effected very ſlowly, ſome years having been taken to do it, and one of the three figures of one piece not being yet changed, but remaining black while the other two are red; this is a very ſingular property in the body, and is plainly neither owing to the Orpiment it contains, nor to Arſenic, nor any other known mineral, as is plain from this, that the numbers on thoſe ſubſtances in the ſame collection, written with the ſame ink, are none of them thus changed.

It is found in the mines of Germany, but is of very little value; all the Orpiments have been eſteem'd of late ages poiſonous, and many of the moderns have eſteem'd them the ores of Arſenic; the antients gave them inwardly as well as us'd them externally; and experiments ſhew, that they may be given with ſafety to brutes; I have cauſed a dog to eat no leſs than two drams of the native yellow Orpiment, and at another time as much of the burnt red kind, produced by melting the former, and no harm was received from either; the flowers ſaved in burning it, Hoffman declares, alſo are not poiſonous tho' violently emetic; but it is to be obſerv'd, we want not medicines which we know to be ſafe, and it were to be wiſh'd Orpiment might never be brought into uſe among us, were it only for fear of the fatal effects of the ignorance of our preſent race of Druggiſts, who will not be convinced that Orpiment and yellow Arſenic are not the ſame ſubſtance, but conſtantly ſell that terrible poiſon under its name.

Simple inflammable Foſſils.

SERIES I.

CLASS I. ORDER II. GENUS II.

SUCCINUM, AMBER.

An inflammable foſſile ſubſtance, dry, very pellucid and very hard, not compos'd of flakes, plates or any other viſible Moleculæ, but of one pure, homogene and uniform ſtructure; fuſible in a ſtrong fire, of a bituminous and ſub-aſtringent taſte, of a very fragrant ſmell when rub'd, and endu'd in a high degree with the property call'd from its name (Electrum) electricity.

THERE have been as many erroneous opinions about the nature and origin of Amber, as about almoſt any ſubſtance in the whole foſſile world, ſome having taken it for an animal ſubſtance, and moſt for a vegetable reſin, which laſt opinion obtains with many even to this day; there is, however, no doubt to be made, but that it is wholly of mineral origin, and is a Bitumen once liquid, and of the Naphtha or Petroleum kind, harden'd and brought into its preſent ſtate by a mineral Acid of the nature of the ſpirit of Sulphur, or oil of vitriol, both theſe ſubſtances abounding in the earth, and an artificial mixture of them producing a body very much reſembling the native Amber, and affording all its principles on a chymical analyſis.

Authors have alſo mention'd three different ſpecies of Amber, that Foſſil being frequently found of three colours, white, brown and yellow; but they might alſo have from the ſame reaſoning added ſeveral others, ſince it is ſometimes, tho' more rarely, found reddiſh, greeniſh and even black, in which laſt ſtate it is an extreamly valuable ſubſtance and infinitely preferable to the fineſt Jet; theſe, however, are no eſſential differences, but are merely the effects of heterogene particles of metalline and other kinds, being received into the Amber while yet not perfectly hardned; and indeed Amber being a pellucid Foſſil, and form'd in the neighbourhood of vitriolic, metalline, and other the like ſubſtances, it can be no wonder that it ſhou'd be like the other pellucid Foſſils, the Cryſtals and Spars, in ſome degree ſubject to the various tinges theſe heterogene ſubſtances can impart.

The flies, and other inſects found in Amber, have been ſuppos'd by many a proof of that ſubſtance having been of vegetable origin and once ſoft; that they do prove the laſt is unqueſtionable, but by no means the firſt: we are to conſider on this occaſion that tho' flies, &c. are frequently found in Amber, yet Amber is infinitely more frequently found without them. That more than a thouſand maſſes of Amber are found free from theſe bodies, for one that is found to contain them; all that is us'd among the apothecaries being in a manner free from them, and moſt of what is work'd up into toys, the few ſpecimens that have them having been almoſt all carefully preſerv'd, make a figure indeed in the cabinets of the curious; but when we recollect the immenſe quantities of Amber that have been found without any ſuch bodies, in the courſe of years theſe have been collecting, we ſhall conclude that a thouſand of them to one is no immoderate proportion; to this unfrequency of theſe pieces, let it be added, that all that contain flies, &c. are of the fine waſh'd Amber kind, that is, of that which has been pick'd up on the ſea ſhore, very few accounts that can be depended upon having been given of any dug out of the earth with theſe in it: let us finally conſider, that much of the native liquid Bitumens is continually trickling down the outſides of rocks and hills; and only ſuppoſe that ſome of this lodg'd in ſmall cavities or otherwiſe detain'd, may have ſuffer'd its change into Amber leiſurely on the ſurface of the earth, from the matter of the Pyrites, or other matrix of its acid being near, and we ſhall find no wonder that a flie or other inſect, might be incloſed and bedded in a Foſſil ſo form'd.

That ſuch lumps of Amber as theſe may have been either carry'd by ſome accidents to rivers, and thence to the ſea, or even bedded afterwards under the earth, from the changes we continually ſee in the face of the earth, can appear no way wonderful, nor wou'd it be at all impoſſible that foſſile Amber might be often found with flies, yet its more frequent appearance with theſe inſects in it on the coaſts, is a collateral evidence of its having been form'd according to this conjecture on the ſurface of the earth.

Having premis'd thus much concerning the nature, origin and common accidents of Amber, and obſerv'd that there is in reality but one ſpecies of Amber in the world, however alter'd by accidents, we may proceed to its general deſcription.

It is a very beautiful ſubſtance, of a fine, uniform and regular texture, very light, yet heavy enough to ſink in water, and naturally of a rough, rude and ſcabrous ſurface; when rub'd it is of a very fragrant ſmell. When its rough coat is off, even without poliſhing when a broken ſurface comes in view, it is very ſoft and ſmooth to the touch, and is found in all the irregularity of ſhape of the common Pebbles: it is of various ſizes, but its moſt uſual ſtandard is between half an inch and three inches in diameter. Its natural colour is a very beautiful pale yellow, but it is ſubject to be alter'd from this by admixtures of various kinds, ſome of mere earthy matter, which render it either white or black, and opake, and others of the metalline tinges, which give it a reddiſh or greeniſh caſt, leaving it as pellucid as the common Amber, but theſe are very rare; and beſide theſe changes, its yellowneſs very often degenerates into a brown. It is conſiderably hard, breaks with a ſmooth ſurface, and even in the largeſt pieces is very tranſparent.

It makes no effervefcence with Acids.

View'd by the Microſcope, it appears very bright and of a plain uniform ſtructure.

It does not melt ſo eaſily as the other bodies of this ſeries, nor is ſo readily inflammable, it will melt, however, in a ſtrong fire, and appears then a foaming, bubling maſs, cover'd with a bright and vivid reddiſh white flame, and if diſtill'd in cloſe veſſels yields firſt a ſub-acid water with an oily fetid ſmell, next a yellow and very fetid oil and volatile ſalt, and finally a thick and browniſh oil more fetid than the firſt. The ſame ſubſtances are to be produced from Naphtha and oil of Sulphur, and the oil of Amber itſelf very remarkably reſembles the native Naphthæ, allowing to the differences between our fires and the gentle chemiſtry of nature; and the reſiduum ſo much reſembles the Bitumen Judaicum, to be too often ſold by our Druggiſts in its place.

Amber is found in many parts of Europe, particularly in Pruſſia; ſome parts of France, Italy, and Sicily, alſo afford it in conſiderably plenty, nor is our own country without it; Dr. Woodward has recorded many places where it is found with us, and I have myſelf pick'd it up very fine and beautiful on the Yorkſhire ſhores, and of a coarſe and friable brown kind in the clay pits of Leiceſterſhire, Northamptonſhire and many other counties; the neighbourhood of London alſo affords us ſome that is tolerably fine. I have ſeveral fair ſpecimens pick'd up in the tile clay pits in the fields between Tyburn and Kenſington gravel pits, and have met with yet finer in the great tile clay pit behind St. George's Hoſpital, at Hydepark corner, one of which I have had wrought, and wear in the head of a cane, near three inches long.

With us the Amber lies at conſiderable depths, in a blue ſtiff clay, and always among the common Pyrites, but whether it has been produc'd there, or brought from elſewhere is a queſtion not eaſy to be determin'd; tho' I am apt to believe it was brought to the pits where I have found it, by the ſame agent that lodg'd the ſhells of the Nautilus Græcorum, and other extraneous bodies among which it is found, in the ſame places.

In Pruſſia, where immenſe quantities of it are dug, it lies uſually below fine ſtrata, the general courſe of which is this, the firſt is of a coarſe yellow Sand; the ſecond a Loam, like our brick earth of a browniſh yellow; the third a thick one of blue clay, like our tile clay; the fourth a ſubſtance reſembling wood, but made up of ſeveral flakes lying over one another; the fifth an immenſe ſtratum of the matter of the Pyrites; and the ſixth another yellow Sand, deeper colour'd and finer than the upper ſtratum among which the Amber lies.

Amber does not readily diſſolve in oil, but is to be melted in a crucible, and when in fuſion pour'd on a marble to cool; this cake when cold is to be powder'd, and will then very readily diſſolve by boiling in linſeed oil, and then makes the fineſt Amber varniſh.

FOSSILS

NATURALLY and eſſentially ſimple, not ſoluble in water; inflammable.

Series the firſt.

Claſs the ſecond.

PHLOGISCIERIA.

Inflammable bodies, of a coarſer and more impure texture, and not pellucid.

Of this claſs there are two Orders, and under thoſe three Genera.

PHLOGISCIERIA.

Order the firſt.

Thoſe found looſe and in detach'd maſſes.

Order the ſecond.

Thoſe found conſtituting whole ſtrata.

PHLOGISCIERIA.

Order the firſt.

Genus 1. AMBRA, *Ambergriſe. A ſolid, dry, opake, inflammable ſubſtance, of an irregular and coarſe ſtructure, of a very agreeable ſmell, extreamly light, ſo as to ſwim on water, very ſoft and friable, eaſily fuſible, running into a fluid maſs like water, with a gentle fire, and burning with a blueiſh white flame, and a very agreeable ſmell.*

Genus 2. GAGATES, *Jet. Solid, dry, opake, inflammable ſubſtances, found in large detach'd maſſes, of a fine and regular ſtructure, having a grain like that of wood, more eaſily ſpliting horizontally than in any other direction; very light, moderately hard, not fuſible, but readily inflammable, and burning a long time with a greeniſh white flame.*

Genus 3. ASPHALTA. *Solid, dry, opake, inflammable ſubſtances, found in ſmall maſſes of no regular ſtructure, or viſible grain, breaking with equal eaſe in any direction, very light, not very hard, fuſible, and readily inflammable, burning ſome time with a greeniſh white flame, and leaving a reſiduum of whitiſh aſhes.*

PHLOGISCIERIA.

Order the ſecond.

Genus 1. AMPELITES. *Cannel Coal. A ſolid, dry, opake, inflammable Foſſil, found in large and continu'd ſtrata, of a fine ſtructure, but no viſible grain, breaking with equal eaſe in any direction, conſiderably light, very hard, not fuſible, but eaſily inflammable, burning a little while, with a bright and vivid whitiſh flame, and afterwards continuing ignited for a long time.*

Genus 2. LITHANTHRAX. *Coal. A ſolid, dry, opake, inflammable ſubſtance, found in large ſtrata, ſplitting horizontally more eaſily than any other way, of a gloſſy hue, ſoft, and friable, not fuſible, but eaſily inflammable, leaving a large reſiduum of aſhes.*

PHLOGISCIERIA.

SERIES I.

CLASS II. ORDER I. GENUS I.

AMBRA, AMBERGRISE.

A ſolid, dry, opake, inflammable Foſſil, very light, of an agreeable ſmell, and melting into a fluid maſs with a very gentle fire.

THIS is a Genus of which there is but one ſpecies; it is uſually diſtinguiſh'd into the black and grey, but theſe are only two appearances of the ſame ſubſtance.

Ambergriſe is a ſubſtance which has been as differently gueſs'd at, as to its nature and origin, as any thing in natural hiſtory; a multitude of authors have had their favourite ſyſtems in regard to it, and every one has had a number of followers: Some have judg'd it the exſudation of a tree, others an animal ſubſtance; and many in particular, that a honey comb has been the original of it; among the later writers there have not, however, been wanting ſome who have refer'd it to the mineral kingdom to which it aſſuredly belongs, being no other than a frothy and light Bitumen exſudating out of the earth in a fluid form, and afterwards hardening into the conſiſtence in which we ſee it; its having been once ſoft and fluid, is evinc'd by the ſame proof that we have of the common Ambers having been ſo; which is, that it frequently contains extraneous bodies, immers'd in its moſt ſolid maſſes, which could not have been admitted there at any time but when it was in a fluid or ſoft ſtate; ſmall ſhells, little pebbles, and grains of ſand are not unfrequently found in it, and ſometimes the heads and beak mouths of the Calamary, and other fiſh of that kind: Theſe have been miſtaken for the beaks of Parroquettes, and other birds, and from that error great confuſion, and many extravagant gueſſes have ariſen; the extraneous bodies found in it are, in general, ſuch as it might be naturally ſuppos'd to pick up at the bottom of the ſea, tho' there are ſome which one would ſomething wonder how it got, ſuch as pieces of honey comb, and the like.

It is a coarſe and irregular ſubſtance, of an extreamly lax and incoherent texture, being remarkably light, ſo as not to ſink in water, of a rude, rugged, and unequal ſurface, very ſoft and fatty, like ſuet or tallow to the touch, of an exceedingly agreeable, and highly perfum'd ſmell, and extreamly various and uncertain in ſhape and ſize; it is found in maſſes, from an ounce in weight to twenty, thirty, or forty pounds, and even much larger than that, but ſuch are very rare, and ſeldom heard of, its moſt uſual ſtandard is from four to ten ounces; theſe are of all irregular figures, but moſt uſually ſomewhat flatted, and of rugged and irregular edges; it has no ſort of brightneſs on the ſurface, and is very ſoft and friable, its natural colour, when moſt pure and perfect, is a pale grey, but it moſt frequently ſhews, on breaking, a rough and unequal ſurface, made up of ſmall Moleculæ, partly white, partly black, and partly of a pale yellowiſh tinge; when theſe are all perfectly mix'd, the whole maſs muſt naturally appear of a true grey, which is its beſt colour; but the whitiſh particles are apt to waſh off ſometimes, and leave the blackiſh alone, which are ſomewhat of a firmer ſtructure, and leſs ſcented than they, and the Ambergriſe then is harder, blackiſh, and much leſs valuable.

It makes no effervеſcence with Aqua Fortis.

Examin'd by the Microſcope, its paler parts appear of a very lax, duſky, cavernous, and ſpungy ſtructure, its blacker ſpecks much more compact and firm, and have much the look of the Bitumens. It melts very freely and readily; running into a maſs as fluid as water, with a very ſmall degree of fire; it readily ignites and burns with a vivid whitiſh flame, and when pure and fine, leaves very little remainder, burning almoſt wholly away.

It is found waſh'd on the ſea coaſts in many places; the Eaſt and Weſt-Indies have both afforded it, and the coaſt of Africa is famous for it; it has been alſo found on the ſhores of Italy, and is ſaid to have been met with more than once on thoſe of our own dominions.

It is of great uſe to the perfumers, and is ſometimes preſcrib'd with us in medicine; a little of it is in ſome of the ſhop compoſitions, and extemperaneous practice ſometimes, tho' rarely takes it in; but in the eaſtern nations it is in high repute, and is continually given as a cordial, a ſtrengthner, and a prolonger of life.

It was not known to the Antients.

Simple inflammable Foſſils.

SERIES I.

CLASS II. ORDER I. GENUS II.

GAGATES, JET.

A ſolid, dry, opake, inflammable ſubſtance, found in large detach'd maſſes, of a fine and regular ſtructure, having a grain like that of wood, ſplitting more eaſily horizontally than in any other direction, very light, moderately hard, not fuſible, but readily inflammable, and burning a long time with a fine greeniſh white flame.

THERE ſeems to have been more confuſion and error about the inflammable Foſſils than about any other part of the mineral kingdom; and this ſubſtance has not eſcap'd without its ſhare of the misfortune; being ſo little known, even in our own country, where the fineſt in the world is produc'd, that it is generally confounded with a common and very different ſubſtance, a thing of almoſt infinitely leſs value, the common Ampelites or Cannel coal. Notwithſtanding that, theſe ſubſtances are as different, except in colour, as two bodies of the ſame claſs can well be, yet ſcarce any one is to be found who underſtands the difference, or indeed believes there is any other Jet than Cannel coal; it may not be improper therefore to clear up this point, by bringing together here the characters of the two Genera, and oppoſing them to one another, before we enter on the particular deſcriptions of either. Theſe are, that Jet is always found in detach'd maſſes, lodg'd in other ſtrata, whereas Cannel coal makes whole ſtrata itſelf; that Jet has the grain of wood, and ſplits horizontally much more eaſily than any other way, whereas Cannel coal has no diſtinguiſhable grain, and ſplits equally even in all directions; Jet alſo is but moderately hard, Cannel coal not leſs ſo than many ſtones; and Jet when ſet on fire flames a long time, and Cannel coal but a little while.

Gagates, or Jet, is thus diſtinguiſh'd from the Cannel coal, and is an extreamly beautiful and valuable Foſſil; it is of an extreamly firm, compact, and cloſe texture, of a tolerably ſmooth and even ſurface, very light, and conſiderably ſoft and ſmooth to the touch; it is ever found in looſe and detach'd maſſes, lodg'd in the ſtrata of other matter, and thoſe ever, in ſome meaſure, of a determinate form, all of them being flatted, and thick in the middle, and gradually thinner toward the edges; they are ſometimes of a roundiſh figure, but more frequently of an oblong one, reſembling a board very thick in the middle, and taper'd off to the edges every way, and, but that it wants the crooked figure, looking much like a rib; theſe are its general ſhapes, eſpecially in the larger pieces, but in ſmall maſſes it is of all irregular figures. It is found of all ſizes, from three or four inches to two or three feet in length, and from one to five, ſix, or eight inches in thickneſs in the middle: Nay, Dr. Woodward, who has accurately deſcrib'd it, and excellently diſtinguiſh'd it from the Cannel coal, and who, by his deſcription, has plainly been upon the ſpot where it is found in greateſt plenty, tells us of a Gentleman there who had ſeen maſſes of it eight or nine foot in length.

It is of a very beautiful and regular internal ſtructure, reſembling, when broken, the very cloſe and compact fibres of ſome very fine wood, and never eaſily breaking any way but in a direction parallel to the courſe of thoſe fibres, it is ever of a fine deep and gloſſy black, and is naturally very bright and ſhining, but not in the leaſt tranſparent; it breaks eaſily, and with a very fine and ſmooth ſurface.

It makes no effervеſcence with Aqua Fortis.

Examin'd by the Microſcope, its texture is very beautifully ſeen; it is evidently of the ſame finely ſtriated ſtructure it appears to the naked eye, but is alſo diſcover'd to be compos'd of a multitude of parallel plates or flates laid extreamly nicely, cloſely, and evenly on one another, which is the plain reaſon of its ſplitting ſo readily and evenly in an horizontal direction. It is not fuſible, but readily takes fire, and burns with a vivid, bright, whitiſh flame, which continues a long time, and may be renew'd when it goes out, till it leaves only a very ſmall reſiduum of whitiſh aſhes.

It is found in Italy, Germany, and the Eaſt-Indies, but no where ſo plentifully as in England; it is very common in Yorkſhire, and other of the northern countries, lodg'd in ſtrata of earth and ſtone, and is frequently diſcover'd in the clifts, and on the ſhores, and pick'd up to ſome advantage; it is alſo found in ſmaller ſpecimens in many of our clay pits about London; I have met with it in the tile clay pits near Tyburn, and the great one at Richmond; and Mr. Da Coſta, a gentleman to whoſe knowledge and diligence in theſe ſtudies it is not eaſy to give too great a character, has found many fair ſpecimens of it in the brick clay pits near Gray's-Inn-Lane.

Simple inflammable Foſſils.

SERIES I.

CLASS II. ORDER I. GENUS III.

ASPHALTA.

Solid, dry, opake, inflammable ſubſtances, found in detach'd maſſes, of no regular ſtructure, or viſible grain, breaking with equal eaſe in any direction, very light, not very hard, fuſible, and readily inflammable, burning ſome time with a greeniſh white flame, and leaving a reſiduum of white aſhes.

1. *Aſphaltum nigrum lucidum, lævius, quod Bitumen Judaicum Authorum.*

Light, ſhining-black Aſphaltum; the Bitumen Judaicum of Authors.

THIS is a very fine and pure ſubſtance, of a cloſe, compact, and regular texture, and very remarkably light; it is of a rude and rugged external ſurface, has leſs ſmell than the other Aſphalta, and is very ſoft and ſmooth to the touch; it is very indeterminate in ſhape and ſize, but is more uſually found oblong and flat than of any other form, and is met with, in maſſes, from one inch to ſix or eight in diameter, and ſometimes, tho' rarely, larger; it is of a ſomewhat coarſe and duſky look on the outſide, but when broken appears of an extreamly ſmooth, bright, and gloſſy ſurface, of no determinate ſtructure, or viſible grain, but ſeeming one pure, equable, and uniform maſs, and is of a very fine deep black; but when held up againſt the light in thin pieces, is ſomewhat duſkily tranſparent, and appears of a deep reddiſh orange colour; it is not very hard, and breaks equally in any direction, having a plainly bituminous ſmell when freſh broken, but that much leſs offenſive than in the other kinds.

It makes no effervеſcence with acids.

View'd by the Microſcope, it appears of a plain uniform texture, very cloſe and compact in its ſtructure, and very bright and gloſſy.

It readily melts with a ſmall fire, but does not run into a pure and equal fluid maſs, but bubbles, and looks foul and duſky, boiling often very high up in the veſſel; it very readily takes fire, and burns ſome time with a greeniſh white flame, which may be once or twice rekindled when it goes out, and finally leaves a reſiduum in powder, in the form of white aſhes.

It is found in many parts of Ægypt, but generally lies at a conſiderable depth; it is the ſpecies that ought to be uſed in medicine, whence the Bitumen Judaicum is ordered, but very little of it ever gets to us; the preſent practice indeed, takes very little notice of it, and in whatever compoſitions it is ordered, our Druggiſts compel us to uſe the following ſtinking ſpecies in its place, or elſe in the room of that the Caput Mortuum left after diſtilling the ſalt and oil of amber.

2. *Aſphaltum fœtidum, nigrum, durius.*
Hard, ſtinking, black Aſphaltum.

This is a coarſe and foul Bitumen, and of a very diſagreeable ſmell, eſpecially when freſh, or freſh broken. It is of a coarſe and irregular texture, compared to that of the former ſpecies, and is conſiderably heavy for a body of this Genus; it is of a rude, rugged and unequal ſurface, and has not that ſmooth ſoftneſs to the touch ſo remarkable in the finer Bitumen; it is of no determinate ſhape or ſize, but is found in irregular maſſes, from two or three inches to ten or twelve in diameter, uſually of ſcabrous, chap'd and unequal ſurfaces, but ſometimes in form of tolerably ſmooth and even Pebbles; this, however, is an accidental variety, and is owing to ſome of the ſmaller maſſes having been roll'd about by the waves, theſe ſpecimens being never found in digging, but only on the ſhores of lakes and rivers; it is of a deep but not gloſſy black, and is conſiderably hard, when broken it emits a very ſtrong and fetid ſmell, and ſhews an even but not at all gloſſy or polite ſurface, and is not in the leaſt degree tranſparent.

It makes no efferveſcence with Aqua Fortis.

Examin'd by the Microſcope, it appears of a ſomewhat rough, and as it were duſty ſurface, yet of a tolerably even, and cloſe texture.

It melts but very imperfectly over the fire, riſing up in bubbles, and emitting a very offenſive ſmell, and ſoon hardens and becomes incapable of farther fuſion; it readily takes fire, and burns with a vivid white flame, but this laſts only a very ſhort time, and cannot be rekindled, but leaves a crumbly blackiſh grey maſs.

It is found in great plenty about the Dead Sea, and in all the country thereabout not only in digging, but lying on the ſurface of the earth on the ſides of hills, and on the ſhores of rivers; it is not, however, peculiar to that part of the world, but is found alſo in Spain, France, and Italy; it yields an oil which is an excellent cement, and is ſuppos'd to have been the Bitumen which we are told ſupply'd the place of mortar in building the walls of the antient Babylon.

3. *Aſphaltum fœtidum, fuſco nigreſcens.*
Browniſh black, ſtinking Aſphaltum.

This is the coarſeſt of all the Aſphaltums; it is of a moderately compact texture, and is ſo far debas'd by extraneous matter, as to be conſiderably heavy; it is very irregular in ſhape and ſize, but is found moſt uſually in rugged and ſomewhat flattiſh maſſes, from three or four to twelve inches in diameter, and often much larger; it is of no regular internal ſtructure when broken, but appears one plain equable maſs, of an even but not at all ſhining ſurface, and of a duſky browniſh black, without the leaſt gloſs or tranſparence; it is conſiderably hard, and when broken emits a ſtinking bituminous ſmell, and is often found ſomewhat moiſt and damp within, and not unfrequently in hot weather with its outer ſurface a little clammy.

It makes no efferveſcence with Aqua Fortis.

Examin'd by the Microſcope, it appears of a tolerably uniform but very coarſe texture, and has multitudes of ſmall ſhining ſpots much blacker than the reſt, which appear to be particles of a pure Bitumen; it ſeems indeed a compoſition of a quantity of a naturally ſomewhat ſoft Bitumen, blended with ſo large a proportion of fouler matter, as to have almoſt loſt its nature, and many of the characters of the Claſs it would have more properly belonged to, if pure.

It will not perfectly melt over the fire, but the bituminous part of it very freely exſudes from the reſt, and runs into a liquid maſs, which very readily takes fire, burning with a greeniſh white flame, and leaving but a ſmall remainder of white aſhes, the remaining part of the maſs robb'd of this fuſible ſubſtance, readily calcines to a pale brick colour.

It is common in Germany, and in ſome parts of England; we have it in Shropſhire, and in many parts of Wales, where it is call'd the Pitchſtone, but that name is not kept to it alone, but apply'd to many other earthy and laxer ſtony maſſes, into which the liquid Bitumen produced thereabout has happened to inſinuate itſelf.

Simple inflammable Foſſils.

SERIES I.

Class II. Order II. Genus I.

AMPELITES, CANNEL COAL.

A ſolid, dry, opake, inflammable Foſſil, found in large continued ſtrata of a fine equal ſtructure, breaking with equal eaſe in any direction, conſiderably light, very hard, not fuſible but eaſily inflammable, and burning with a bright vivid white flame.

It has been before obſerv'd, that Jet has been by too many, and is too frequently to this day confounded with this ſubſtance; the ſuperior hardneſs of this, however, and its being found in continued ſtrata, were there no other difference between them, might be ſufficient to diſtinguiſh them for different bodies, the latter of theſe characters being ſo eſſential a one as to make them of two different Orders of Foſſils.

THE Ampelites is, tho' much inferior to Jet in many reſpects, yet a very beautiful Foſſil; it is of a very firm, compact ſubſtance, of a cloſe, even and regular texture, and for a body of ſo compact a ſtructure, very remarkably light; it is naturally of a tolerably ſmooth and even ſurface, but is not ſoft or ſmooth to the touch as the Jet is, and is found in large ſtrata, often twelve or more feet in thickneſs; theſe are ſubject to many cracks both perpendicular and horizontal, and the larger of theſe are often coated over on their ſides with cryſtalliz'd Spars, the latter fill'd up with ſubſtances of the ſame kind which then make an appearance of fine white veins; it is very hard, breaks equally in any direction, and ſhews a tolerably even and ſomewhat gloſſy ſurface where freſh ſeparated; it is of a very good black, but not nearly ſo deep a one or ſo ſhining as Jet, and even in the thinneſt pieces has not the leaſt tranſparence.

It makes no effervèſcence with Aqua Fortis.

Examined by the Microſcope, it appears of a very uniform and regular ſtructure when cloſely examin'd, being ſeen to be compos'd of innumerable very ſmall and thin plates laid cloſely and firmly on one another, and full of very ſmall ſpecks of a blacker and more ſhining matter than the reſt, which is evidently a purer Bitumen than the general maſs. Theſe ſpecks are equally diffus'd over the different parts of the maſſes.

It is dug in many parts of England, but the fineſt we have is in Lancaſhire and Cheſhire, it lies uſually at conſiderable depths. It makes a very briſk fire, flaming violently for a ſhort time, and after that continuing red and glowing hot along while, and finally is reduced into a ſmall proportion of grey aſhes, the greater part of its ſubſtance having flown off in the burning; beſide this uſe, it is capable of a very high and elegant poliſh, and in the countries where it is produced is turned into a vaſt number of toys, as ſnuff boxes and the like, which bear all the nicety of turning, and look extreamly bright and gloſſy when finiſh'd.

Inflammable Foſſils.

SERIES I.

CLASS II. ORDER II. GENUS II.

LITHANTHRACES, COALS.

Solid, dry, opake, inflammable ſubſtances, found in large ſtrata, ſplitting horizontally more eaſily than in any other direction, of a gloſſy hue, ſoft and friable, not fuſible, but eaſily inflammable, and leaving a large reſiduum of aſhes.

1. *Lithanthrax durior, ſordide-nigreſcens.*
Hard, duſky black Coal.

THIS is one of the ſpecies of Coal in common uſe in London, and many other parts of the kingdom, and is called, Scotch Coal, tho' that name is not ſtrictly apply'd to this ſpecies alone, but the following kind more diſtinctively call'd Welch Coal, is often ſold under the ſame denomination. It is a conſiderably firm and compact ſubſtance, of a moderately cloſe texture, and conſiderably heavy; it is naturally of a rough, rugged and duſty ſurface, and is uſually ſeen in flat maſſes, tho' it naturally conſtitutes large and continued ſtrata, but being of a laminated ſtructure in theſe, it naturally breaks into maſſes of this ſhape in the digging, and theſe more readily ſplit or break horizontally than in any other direction, tho' by no means regularly or evenly in that; it is rough and harſh to the touch, and of a rude and rough ſurface; it is of a very ſtrong and deep black, but not at all gloſſy or ſhining, and when broken, is much leſs ſo than any other Coal.

It makes no efferveſcence with Acids.

Examin'd by the Microſcope, it appears of a tolerably compact and cloſe texture, of an irregularly laminated ſtructure and conſiderably bright.

It is very readily inflammable, and burns briſkly, giving a bright white flame, and burning away very quick into aſhes, not into cinders in the manner of the common Coal; this is owing to its being more purely bituminous and regularly inflammable; the maſſes of the common Coal becoming extinct before they are half conſum'd, theſe never going out till they are wholly burnt away.

It is dug in great quantities in many parts of the kingdom, about Limington there is ſo much of it, and ſuch quantities of it are ſent from thence, that it is in many places call'd Limington Coal.

2. *Lithanthrax lucida, durior.*
Hard, gloſſy Coal.

This is a ſpecies of Coal, ſometimes ſold in London under the name of Scotch Coal, but known in many parts of the kingdom under the name of Welch Coal, and is much eſteem'd for its burning with leſs ſmoak than any other kind.

It is a very firm and compact body, of a cloſe, even and regular texture, and conſiderably heavy; it is naturally of a tolerably ſmooth ſurface, and ſoft to the touch, and is uſually brought to us in moderately large and irregular flat lumps; in the earth it compoſes very large and thick ſtrata, which being of a laminated ſtructure, it naturally falls into maſſes of this ſhape in breaking; it is the hardeſt of all the ſpecies of Coal, but is not nearly ſo hard as the Ampelites; it breaks more eaſily horizontally than in any other direction, tho' not regularly or evenly in that; and when freſh broken is very bright and gloſſy, and of a very fine deep black.

It makes no efferveſcence with Aqua Fortis.

Examin'd by the Microſcope, it appears of a very remarkably even texture, and of a laminated ſtructure, being compos'd of numerous ſmall and thin plates or flakes laid cloſely on one another, and each of theſe of many other much thinner and finer; the Microſcope ſhews, however, ſome parts of theſe thinner flakes to be much purer, blacker, and more gloſſy than the reſt.

It is dug in vaſt quantities in Wales, and in many parts of England; it is very readily inflammable, and burns with a bright vivid white flame, and almoſt wholly without ſmoak, but does not conſume ſo faſt as the former ſpecies, or burn away at once to aſhes, but makes cinders like the common Coal.

It is ſo remarkable for its burning without ſmoak, that in ſome parts of this kingdom, and in general in Wales, they make malt with it without previous burning.

3. *Lithanthrax lucidà, friabilis.*
Friable, gloſſy Coal.

This is a ſubſtance extreamly well known, being the common firing of London, and of the greateſt part of the kingdom; it is dug in different degrees of purity and goodneſs in different places, and the fineſt of this kind is known among the dealers in Coal, by the name of Tanfield Moor Coal, the name of the place where it is dug.

It is a friable ſubſtance, of a ſmooth and even texture, and but moderately heavy, being much lighter than either of the former ſpecies, tho' heavier than the Cannel or Ampelites; it is of an irregular and uneven ſurface, and uſually comes to us in large thick maſſes of very various ſhapes, but not remarkably flat; it conſtitutes immenſe ſtrata in the earth, and is in thoſe of an irregularly laminated ſtructure, and thence is naturally rais'd in broad and flat rather than other ſhap'd pieces, but theſe are ſo brittle that they are eaſily broken tranſverſely, and therefore ſeldom retain long their original flat form; it is ſmooth on the ſurface, and ſomewhat ſoft to the touch, and is of leſs hardneſs than any other Coal; it breaks with a tolerably even and very remarkably bright ſurface, and is of a fine deep ſhining black.

It makes no efferveſcence with Aqua Fortis.

View'd by the Microſcope, appears of an irregularly laminated ſtructure and cloſe texture, and of a very remarkable brightneſs.

It is very readily inflammable, and does not burn ſoon to aſhes.

It is dug about Newcaſtle, whence it has its name of Newcaſtle Coal, and in vaſt plenty in a great many other parts of the kingdom.

FOSSILS

NATURALLY and eſſentially ſimple, not ſoluble in water; inflammable.

Series the ſecond.

Simple, inflammable Foſſils, in a liquid form.
Of this Series there are two Claſſes.

The firſt is of thoſe of a thinner conſiſtence, and pellucid. *The* GELÆOPSILA.

The ſecond is of thoſe of a thicker conſiſtence and opake. *The* GELÆOPACHIA.

Each of theſe claſſes contains only one known Genus.

Simple inflammable Foſſils.

SERIES II.

CLASS I. GENUS I.

NAPHTHÆ.

Fluid mineral bodies of a thin conſiſtence, bright and pellucid, of a ſtrong ſmell, very readily inflammable, and when pure burning away without leaving any reſiduum.

1. *Naphtha flaveſcens, quæ Naphtha antiquorum.*
Yellowiſh Naphtha, the Naphtha of the antients.

THIS is a very pure and clear mineral fluid, of a much thinner conſiſtence than any of the expreſs'd oils of vegetables, but ſomething thicker than the finer of the diſtill'd ones; of a very bright hue, perfectly clear and pellucid, and of a pale yellow, with ſome very faint caſt of browniſh among it. It is indeed exactly of the colour of the more common, browniſh, yellow Amber us'd by the Apothecaries; it is of a very briſk and penetrating ſmell, ſomething like that of the chymical oil of Amber, but not ſo ſtrong or offenſive.

It will not mix either with ſpirit of wine, Aqua fortis or water.

It is very inflammable, readily catching fire, and burning with a briſk and vivid flame, which may be re-kindled after its going out; and if this be repeated; when pure it burns wholly away, without leaving the leaſt remainder.

It is found in conſiderable quantities floating on the waters of certain ſprings, principally breaking out at the ſides of hills in Perſia, Tartary, and ſome parts of the empire of China; where if a lighted candle be brought near the ſurface it takes fire, and overſpreads the ſurface of the water for a great extent with a ſtrong white flame, and emits a very diſagreeable ſmell.

This genuine Naphtha is very rare in Europe, it is not known to be any where naturally produc'd here, and what we ſee of it is generally ſophiſticated. I receiv'd ſome months ſince about ſix ounces of it, a preſent from my very much eſteem'd friend Mr. Theobald, whoſe love to natural knowledge induc'd him to ſpare me with great pleaſure that quantity, in order to try what it wou'd yield on diſtillation; this drawn over in a ſmall retort afforded a ſomewhat clearer and thinner liquor of the ſame kind with what it was in its native ſtate but leſs colour'd, leſs ſtrongly ſcented and leſs inflammable; the reſiduum at the bottom of the retort prov'd a dry, friable ſubſtance, very remarkably reſembling Amber.

If this Naphtha were more common, it ſeems as if by the aſſiſtance of fire and a proper mineral acid, natures operations in the production of Amber might be very cloſely imitated, and a ſubſtance of the ſame nature be the effects of them; tho' I am afraid without the hardneſs and value of the native Amber. If it ſhou'd happen in the way of any curious perſon to make trials of this kind, it wou'd be adviſable not to be diſheartened at one Acids not ſucceeding, but to try them all; particularly that drawn from the crude Pyrites, for the effects of the different Acids are very diſſimilar on the ſubjects of the foſſil world; an inſtance of which may be given in the common Spars, which in Aqua Fortis diſſolve into a clear liquor, limpid as water, and in oil of vitriol into a white thick opake Coagulum reſembling Caſtile Soap.

2. *Naphtha tenuior, quæ Petroleum officinarum.*
Thin Naphtha, the Petroleum of the ſhops.

This is a very thin, ſubtile and penetrating mineral fluid, much thinner than the yellow Naphtha, and as fine as the common diſtill'd oils of vegetables. It is of a very bright hue, extreamly light, very clear and pellucid, of an extreamly ſtrong and penetrating ſcent, but much leſs briſk and much more diſagreeable than that of the yellow Naphtha, and more approaching to the ſmell of the chymical oil of Amber; it is of various colours, but when pure is in all of them of the ſame lightneſs, pellucidity and bright hue. Its natural colour is a very clean, fine and bright white, in this ſtate it is nearly as pellucid as the pureſt ſpring water, and has nothing of the yellowiſh caſt of the former ſpecies, it is often found accidentally ting'd to a browniſh, reddiſh or blackiſh colour, and ſometimes tho' more rarely to a faint greeniſh; the white is of all the moſt eſteem'd, but the colours ſeem very eaſily taken up, for there is near Modena a ſpring which runs three or four miles under ground, ſhewing itſelf at different places, the water of which is every where cover'd with this mineral oil, which is white near the origin of the ſpring, but becomes gradually browniſh and even blackiſh before it diſcharges itſelf at a ſmall orifice near the foot of a hill; this hill alſo abounds with the ſame ſubſtance which trickles down its ſides in ſeveral places with the water, and is in ſome very clear and white, and in others ting'd with different degrees of colour. It is very inflammable and readily takes fire at the approach of a lighted torch to the ſurface of the water, and in ſome places will kindle of itſelf.

It burns with a bright vivid flame, and when pure will burn wholly away without leaving any reſiduum.

It makes no effervefcence with Aqua Fortis, nor will mix readily with it.

Diſtill'd in a retort it yields a fine pellucid liquor, very inflammable, and of a very pungent ſcent, and leaves a maſs reſembling the Aſphaltum at the bottom of the retort.

It is produc'd in all parts of the world, we have of it in ſeveral counties of England, in France and Germany it is very common; but the greateſt plenty of it is in Italy, the hills in general abound with it there, and it is uſually found white near their tops, brown toward their middle, and blackiſh at the bottoms of them.

It is us'd inſtead of oil in lamps, but is of a very offenſive ſmell. In medicine, it is alſo eſteem'd very uſeful in Paralytic diſorders, but it is very ſeldom to be found genuine in the ſhops.

Simple inflammable Foſſils.

SERIES II.

CLASS II. GENUS I.

PISSASPHALTA.

Fluid, mineral bodies, of a ſomewhat thick conſiſtence, duſky and opake, of a ſtrong ſmell, readily inflammable, but leaving a reſiduum of greyiſh aſhes after burning.

1. *Piſſaſphaltum tenue, rufo-nigreſcens; quod Oleum terræ quibuſdam.* *Thinner, blackiſh Piſſaſphaltum, call'd by ſome oil of the earth.*

THIS is a conſiderably thick mineral fluid, tho' much thinner than the other ſpecies of this claſs; it is of a duſky, browniſh black, with a faint caſt of purpliſh, of the conſiſtence of a thin ſyrup; of a dull, duſky hue, and very little tranſparent, but of a very ſtrong and penetrating ſmell, extreamly like that of the common diſtill'd oil of Amber; it is very readily inflammable, but does not burn long; it emits a very diſagreeable ſmell in burning, with a dead whitiſh flame, and leaves a large remainder of grey aſhes; diſtill'd by the retort it affords a very briſk ſcented and penetrating oil, much reſembling the pale colour'd native Petroleums, and, like them, readily inflammable, and burning all away without remainder; the maſs left in the retort much reſembles the coarſer maſſes of Aſphaltum.

It owzes out of the cracks of rocks in ſeveral places in the iſland of Sumatra, and in ſome other parts of the Eaſt-Indies, and is much eſteem'd there in paralytic diſorders, and call'd by the natives Miniac Tannah, that is, oil of the earth; we alſo call it Oleum Terræ, but it is ſeldom imported into Europe; what the Eaſt-India Surgeons and Captains bring over, under the ſame name, being a vegetable oil impregnated with the virtues of certain of their Foſſils by boiling.

2. *Piſſaſphaltum craſſius, nigreſcens; quod Piſſælæum Indicum officinarum.* *Thick, black Piſſaſphaltum; the Barbadoes tar of the ſhops.*

This is a heavy, thick, and duſky looking mineral fluid; it is of the colour and conſiſtence of common treacle, and of a very opake hue; it is of a diſagreeable ſmell, faintly approaching to that of oil of amber, but leſs briſk and pungent than in any other of the liquid Bitumens; it is readily inflammable, and burns with a briſk and vivid white flame, but leaves a large reſiduum, which finally calcines into greyiſh aſhes.

It makes no effervefcence with Aqua Fortis.

While burning it emits a ſmell much more diſagreeable than before.

It is found trickling down the ſides of the mountains at the back of ſeveral of our plantations in America, but I cannot hear that it is now any where found in the place from whence we originally nam'd it; it is in great eſteem in many parts of America, for coughs, conſumptions, and all diſorders of the breaſt and lungs; but neither there, nor with us, is often to be met with genuine, ſeveral different ſophiſtications of it having in different places obtain'd credit enough to be readily allow'd of under its name.

3. *Piſſaſphaltum craſſius, viſcoſum, nigrum; quod Piſſaſphaltum officinarum.*

Thick, black, viſcous Piſſaſphaltum; the Piſſaſphaltum of the ſhops.

This is the thickeſt of all the liquid Bitumens; it is a tough and clammy ſubſtance, like bird-lime, and of about the ſame conſiſtence: of a deep but duſky black, and of a ſtrong but leſs diſagreeable ſmell than the other Piſſaſphalta; it very much reſembles the common black pitch, when that is a little ſoften'd by heat, and has been generally thought to have ſomewhat of the ſmell of that ſubſtance; but I am afraid thoſe who have made that judgment of it, have form'd it from the ſmell of ſophiſticated maſſes of it; for nothing is more common than the mixing it with common pitch in the German ſhops, and ſome other places, where it is kept for medicinal uſe; the true and genuine ſubſtance having no other ſmell but that of the other bodies of this claſs, tho' leſs rank than in moſt of them; it is ſomewhat thinner in hot weather than in cold, and when kept ſome time hardens conſiderably, but never becomes like the naturally ſolid bodies of this kind, having always an unctuous ſurface; it is very readily fuſible and inflammable, melting with a ſmall heat, and running into a thin homogene ſubſtance like oil.

It burns with a bright white flame, and leaves but a ſmall remainder of reddiſh white aſhes.

It is produc'd in ſeveral parts of the world; there are large quantities of it in Perſia and Egypt, as alſo in France, but it is no where ſo plentiful as in Italy; it owzes out of the ground principally in warm weather, and is ſo tough and viſcous that people often leave their ſhoes behind them, in walking over the places where it is produc'd in any plenty; it yields in diſtillation a limpid yellowiſh oil, and leaves a large reſiduum of a dry black maſs, reſembling a cinder; the oil is very like the genuine Petroleum, and is ſold in many places under its name.

THE
HISTORY
OF
FOSSILS.

PART the SECOND.

BOOK I.

FOSSILS naturally and eſſentially compound, not inflammable nor ſoluble in water.

Series the firſt.

Thoſe which are found in continued ſtrata.

Of this Series there are two Claſſes.

The firſt is, of thoſe which are moiſt and friable, The Compound EARTHS.

The ſecond is, of thoſe which are dry and hard, The STONES.

Claſs the firſt.

The Compound EARTHS.

Foſſils, compos'd of argillaceous or marley particles, ſeparated and divided by adventitious matter, and never found free from theſe mixtures, or in the ſtate of pure Earths.

Of this Claſs there are two Orders, and under thoſe four Genera.

Compound EARTHS.
Order the firſt.
LOAMS.

Earths, compos'd of diſſimilar particles, hard, ſtiff, denſe, harſh and rough to the touch; not eaſily ductile while moiſt, readily diffuſible in water, and compos'd of Sand and a tough viſcid Clay.

Compound EARTHS.
Order the ſecond.
MOULDS.

Earths, compos'd of diſſimilar particles, of a looſe, ſoft texture; ſomewhat ductile while moiſt, compos'd of argillaceous particles, ſeparated by Sand, or the Gritt of Stone, and uſually found mix'd with the putrify'd remains of animal and vegetable bodies.

Compound EARTHS.

Order the firſt.

Genus 1. THRAUSTOMICTHES. *Loams compos'd of Sand, and a leſs viſcid Clay, and of a friable texture.*

Genus 2. GLISCHROMICTHES. *Loams compos'd of Sand, and a more viſcid Clay, and of a more tough and viſcid texture.*

Compound EARTHS.

Order the ſecond.

Genus 1. THRUPTOMICTHES. *Moulds of a lax, friable texture.*

Genus 2. GLOROMICTHES. *Moulds of a more tough and viſcid texture.*

SERIES I.

CLASS I. ORDER I. GENUS I.

THRAUSTOMICTHES.

1. *Thrauſtomicthes albida.*
Whitiſh Thrauſtomicthes.

THIS is a coarſe, looſe and crumbly Earth; while in the ſtratum, it is ſoft and moiſt, and cuts through eaſily with the ſpade, but falls from it in looſe maſſes, and leaves a rough ſurface behind it.

When dry, it is of a dull greyiſh white, of a lax crumbly texture, and conſiderably heavy; it is of a very rough, uneven ſurface, adheres ſlightly to the tongue, is harſh, hard and gritty to the touch, eaſily crumbles between the fingers, and does not at all ſtain the hands; it melts freely in the mouth, but is very coarſe and gritty between the teeth; thrown into water, it makes a ſlight ebullition and hiſſing, and almoſt immediately falls into a looſe powder.

Examin'd by the Microſcope, it appears of a very looſe texture, compos'd of a large, coarſe, white Sand, held together by a greyiſh marly Clay.

It makes no efferveſcence with Aqua Fortis.

It burns to a pale browniſh red with a little additional hardneſs.

It is dug in Staffordſhire and Northamptonſhire in great plenty, and mix'd with any of the ſtiff Clays, makes a very ſtrong and good pale red brick: About London it is common in thin ſtrata in Sand and Gravel pits, but is made no uſe of.

2. *Thrauſtomicthes albido fuſca.*
Browniſh white Thrauſtomicthes.

This is a looſe crumbly Earth, but of a very fine texture for one of this Claſs; while in the ſtratum it is very moiſt and ſoft, cuts eaſily and tolerably evenly thro' with the ſpade, and leaves an even but not gloſſy ſurface behind it.

When dry, it is of a whitiſh brown colour, ſo very pale, as ſcarce to allow the word brown properly in its deſcription, tho' far from a fair white; of a fine but not cloſe texture, of a tolerably ſmooth and even ſurface, and very heavy; it ſcarce at all adheres to the tongue, is but ſlightly harſh to the touch, is not eaſily broken between the fingers, nor does at all ſtain the hands; it melts but ſlowly in the mouth, and is harſh, but leſs coarſe than moſt of the other Loams between the teeth; thrown into water it raiſes a ſlight ebullition and hiſſing, and after a few minutes moulders into a looſe powder.

Examin'd by the Microſcope, it appears of a ſomewhat ſpungy, but for a Loam, a fine and even texture, and is compos'd of a very fine white Sand, lodg'd in a pale brown Clay.

It makes a violent effervefcence with Aqua Fortis.

In the fire it acquires a great hardneſs, and pale red colour.

It is dug in many parts of the kingdom, and makes a very firm and valuable pale red brick; there is a thick ſtratum of it in the great Clay-pit behind St. George's Hoſpital, at Hyde-Park-Corner, but they don't work it there alone, but mix'd with the other Clays of the pit, which together make very fine and hard brick: It lies there at about nine feet deep.

3. *Thrauſtomicthes pallide flaveſcens.*
Pale yellow Thrauſtomicthes.

This is a very friable and ſpungy Earth; while in the ſtratum, it is of a looſe incoherent texture, harſh and dry, and cuts thro' eaſily but very irregularly with the ſpade, falling in irregular maſſes, and leaving a rough uneven ſurface behind it; when dry, it is of a looſe, ſpungy and incoherent texture, of a pale yellow, ſpangled over with a multitude of ſhining particles, and of conſiderable weight: It is of a rough, uneven, but not duſty ſurface, adheres pretty firmly to the tongue, is harſh and dry to the touch, eaſily crumbles between the fingers, and does not ſtain the hands; it melts very freely in the mouth, and is very coarſe between the teeth; thrown into water, it remains quiet about half a minute, but after that makes a ſlight ebullition with a conſiderable hiſſing noiſe, and immediately after falls into a looſe powder.

Examin'd by the Microſcope, it appears of a very ſpungy texture, compos'd of a white Sand, held together by a yellow Clay, and ſpangled with ſmall thin plates of a foliaceous Talc.

It makes a very briſk effervefcence with Aqua Fortis.

In the fire it acquires a very fair red, with a conſiderable hardneſs.

It is dug in moſt Counties in England, but never uſed alone in brick making; work'd up with the tougher Clays, makes together a very ſtrong brick.

4. *Thrauſtomicthes flaveſcens, durior & aſpera.*
Sharp, rough, yellow Thrauſtomicthes.

This is a very harſh and rough, but a very valuable Earth; while in the ſtratum, it is very moiſt, cuts eaſily and evenly with the ſpade, and leaves a ſmooth ſurface behind it; when dry, it is extreamly hard, of a ſtrong yellow colour, ſometimes variegated with white, of a coarſe but very compact texture, and great weight; it has a rough irregular ſurface, adheres ſlightly to the tongue, is very harſh to the touch, and does not eaſily break between the fingers, nor at all ſtain the hands; it melts readily in the mouth, and is extreamly coarſe between the teeth; thrown into water, it makes a ſlight ebullition and hiſſing, and ſoon falls into a looſe powder.

View'd before the Microſcope, it appears of a very rough texture, and compos'd of a coarſe yellowiſh Sand held together by a pale yellow, and in ſome few places by a whitiſh Clay.

It makes no effervefcence with Aqua Fortis.

It burns to a fine deep red, and very great hardneſs.

It is dug near the Town of Hedgerley, five Miles from Windſor, and in no other place that I know of; it lies there at a very conſiderable depth, and is not to be dug now without very great expence; it makes the bricks us'd in building furnaces for melting iron, and endures even the glaſs-houſe fires; beſide theſe uſes, it is alſo the fineſt of all lutes in Chymiſtry, and ſells at a very conſiderable price. It is not only brought to London, but ſent into all parts of the kingdom, and not a little of it into Germany and Holland.

5. *Thrauſtomicthes ſordide flaveſcens.*
Deep, duſky yellow Thrauſtomicthes.

This is a very coarſe, harſh and friable Earth; while in the ſtratum it is very moiſt, but not at all tenacious, eaſily cut thro' with the ſpade, but falling in irregular lumps, and leaving a rough ſurface behind it. When dry, it is of a very deep duſky yellow, of a looſe incoherent texture, and very heavy; it is of a rough rugged ſurface, adheres but ſlightly to the tongue, is hard, harſh and rough to the touch, eaſily crumbles to pieces between the fingers, and does not at all ſtain the hands; it melts readily in the mouth, but is remarkably coarſe between the teeth; thrown into water, it makes a very ſlight ebullition without any noiſe, and immediately falls into a looſe powder.

Examin'd by the Microſcope, it appears to be a congeries of two very beautiful Sands, a deep yellow, and a whitiſh one, with ſcarce Clay enough intermix'd to hold them together.

It makes no effervesſcence with Aqua Fortis.

It burns to a deep orange colour'd red, with ſome little additional hardneſs.

It is dug in moſt parts of the kingdom, particularly in Dorſetſhire, Northamptonſhire, and about London, and us'd in brick making mixed with the tough fine Clays.

6. *Thrauſtomicthes duriſſima, fuſca.*
Hard, brown Thrauſtomicthes.

This is a very hard but not at all tough or viſcid Earth; while in the ſtratum it is very dry, and firm, not to be dug without pickaxes, and falls in great rude lumps; when dry it is of a duſky brown, of a very hard and firm conſiſtence and great weight, 'tis of a rough duſky ſurface, adheres pretty firmly to the tongue, is rough, dry, and harſh to the touch, is not to be broken between the fingers, and does not at all ſtain the hands; it breaks pretty freely in the mouth, and is very coarſe and hard between the teeth; thrown into water, it makes a very ſlight ebullition without noiſe, and does not readily diſunite or break in it.

Examin'd by the Microſcope, it appears of a very firm texture, and compos'd of a large white Sand embodied in a deep brown Clay.

It makes no effervesſcence with Aqua Fortis.

In burning it acquires a very deep red without any additional hardneſs.

It is dug in many parts of the kingdom, ſometimes pure, but generally full of ſmall ſea ſhells; in Staffordſhire and Buckinghamſhire, they have it pure, and uſe it in brick-making; in Northamptonſhire, they have it full of ſhells, and call it there Penny Earth, and uſe it on many occaſions; when well beat together it dries into a very firm hard maſs, and they make of it floors for barns, and other places; and cover the tops or ridges of walls, and thatch'd houſes, and even the roofs of their ovens with it; it is of little leſs hardneſs when thoroughly dry than plaiſter of Paris, and bears the weather extreamly well; we have vaſt quantities of this about Deptford and Woolwich, but I don't find that we have ever brought it into any uſe there.

7. *Thrauſtomicthes levior, pallide fuſca.*
Light, pale brown Thrauſtomicthes.

This is the looſeſt, lighteſt and moſt ſpungy of all the Loams; while in the ſtratum it is moiſt, and of a very lax rare texture, and very eaſily cut with the ſpade, but falling irregularly from it; when dry, it is of a pale brown, with ſome ſlight caſt of yellowiſhneſs, of a ſpungy cavernous texture, and looking much like the Earths that have been waſh'd, and remarkably light for an Earth of this Claſs; it is of a rude, irregular and ſomewhat duſty ſurface, adheres not at all to the tongue, is dry, harſh and rough to the touch, eaſily crumbles to pieces between the fingers, and a little ſtains the hands; it melts very freely in the mouth, and is leſs coarſe than many other Loams between the teeth; thrown into water, it makes a conſiderable ebullition with ſome hiſſing, and almoſt immediately falls into a looſe powder.

Examin'd by the Microſcope, it appears of a very looſe texture, and compos'd of a fine pale yellow Sand, held together by a light brown Clay.

It makes no effervеſcence with Aqua Fortis.

In the fire it acquires a duſky browniſh red, with no great hardneſs.

It is dug in Northamptonſhire, and many other parts of England, and is ſometimes uſed in mixture in brick-making. At Peterborough it is us'd, mix'd with a brown ſtiff Clay for making the bellfounders moulds.

8. *Thrauſtomicthes flavo-fuſca.*
Yellowiſh brown Thrauſtomicthes.

This is a common brick Earth about London, and in many other parts of the kingdom; while in the ſtratum, it is commonly moiſt, but not tough or viſcid; it cuts eaſily, but falls into rude rough pieces, and leaves an irregular ſurface behind the ſpade; when dry, it is of a pale yellowiſh brown, of a looſe crumbly texture, and not ſo heavy as moſt of the other Loams: it is of a rough and ſomewhat duſty ſurface, adheres not at all to the tongue, breaks eaſily between the fingers, and does not at all ſtain the hands; it melts freely in the mouth, but is coarſe and harſh in a great degree between the teeth; thrown into water, it makes a ſlight ebullition and hiſſing, and immediately falls into a looſe powder.

Examin'd by the Microſcope, it appears of a very looſe texture, and compos'd of a mixture of a white and yellow Sand, with a ſmall quantity of a fine brown Clay.

It makes a conſiderable effervеſcence with Aqua Fortis.

It burns to a fine high red, but without much hardneſs.

It is dug in many parts of the Kingdom, and when work'd alone, and properly burnt, makes the fine red bricks us'd in the ornamenting buildings; but about London, moſt of it is mix'd with aſhes and tougher Clays, and made into the common pale red bricks.

SERIES I.

CLASS I. ORDER I. GENUS II.

GLISCHROMICTHES.

The tougher and more viſcid Loams.

1. *Gliſchromicthes albido cinerea.*
Greyiſh white Gliſchromicthes.

THIS is of a denſe, compact and leſs crumbly texture than moſt of the Loams; while in the Earth it is moiſt, ſoft, and in ſome degree viſcid and tenacious, it cuts very eaſily and evenly through with the ſpade, and leaves a ſmooth and in ſome degree gloſſy ſurface behind it; when dry, it is of a pale blueiſh or aſh-colour'd grey, very heavy, of an even and compact texture, and ſpangled with a multitude of ſmall glittering particles; it is of an even and ſmooth ſurface, adheres pretty firmly to the tongue, is tolerably ſoft and ſmooth to the touch, cannot be broken between the fingers, nor does at all ſtain the hands; it melts but very ſlowly in the mouth, and is leſs coarſe and gritty than moſt of theſe Earths between the teeth; thrown into water, it makes a ſlight ebullition and hiſſing, and after a little time breaks into ſmall lumps, and from them ſoon after falls into a looſe powder.

Examin'd by the Microſcope, it appears of a fine and ſomewhat compact texture, and is compos'd of a fine white ſand, held together by a pale blueiſh clay, and ſpangled with a multitude of ſmall plated fragments of Selenitæ.

It raiſes a great effervеſcence with Aqua Fortis.

It burns to a great hardneſs, and a handſome red, but is very apt to burſt in the fire.

It is dug in many counties in England, and makes a very valuable brick, but requires ſo much working that it is ſeldom us'd alone; there is a ſtratum of it in the great clay pit behind St. George's Hoſpital, at about eleven feet deep, and they mix it there with the other brick clays.

2. *Gliſchromicthes pallidiſſime flaveſcens.*
Pale-yellow Gliſchromicthes.

This is a denſe, firm, and compact Loam; while in the ſtratum it is moderately moiſt, and ſomething tough or viſcid; it cuts very eaſily and evenly thro' with the ſpade, and leaves a ſmooth, but not gloſſy ſurface behind it; when dry, it is of a firm, hard texture, and very pale-yellow colour, ſpangled with a fine foliaceous Talc, moderately heavy, and of a tolerably ſmooth, but hard ſurface; it ſcarce at all adheres to the tongue; is dry, and ſomewhat harſh to the touch; is not eaſily broken between the fingers, nor at all ſtains the hands; it melts but ſlowly in the mouth, and is not ſo coarſe as many others between the teeth; thrown into water it makes very little ebullition, or hiſſing, but after a few minutes falls into a looſe powder.

View'd by the Microſcope, it appears of a looſe ſpungy texture, and compos'd of a ſmall whitiſh ſand, held together by a pale-yellow clay.

It makes no effervеſcence with Aqua Fortis.

In the fire it acquires a fine florid red, without any conſiderable hardneſs.

It is dug in moſt parts of England, and makes a fine red brick.

3. *Gliſchromicthes flavo-fuſca.*
Yellowiſh-brown Gliſchromicthes.

This is the common brick earth of London, and many other parts of the kingdom; while in the ſtratum it is very firm, tough, and viſcid, cuts evenly and eaſily thro' with the ſpade, and leaves a ſmooth, even, and ſomewhat gloſſy ſurface behind it; when dry, it is of a duſky, yellowiſh brown, of a cloſe, compact and firm texture, and very heavy; it is of a tolerably ſmooth and even ſurface, adheres not at all to the tongue, is ſomewhat ſmooth to the touch, is not eaſily broken between the fingers, nor at all ſtains the hands; it melts but ſlowly in the mouth, and is very coarſe and gritty between the teeth; thrown into water it makes a ſlight ebullition and hiſſing, and after ſome time crumbles into ſmall pieces, and from them moulders into powder.

Examin'd by the Microſcope, it appears of a looſe texture, and compos'd of a white and a yellowiſh ſand, held together by a conſiderable quantity of a fine brown clay.

It makes no effervеſcence with Aqua Fortis.

It burns to a good red, with great hardneſs.

It is dug in moſt parts of England, and makes very fine brick, but about London it is ſeldom us'd pure, but mix'd with aſhes, dirt out of the ſtreets, &c.

4. *Gliſchromicthes fuſco-rubeſcens.*
Reddiſh-brown Gliſchromicthes.

This is a common brick earth in ſome counties; while in the ſtratum it is of a firm and ſomewhat viſcid texture, cuts evenly with the ſpade, and leaves a ſmooth ſurface behind it; when dry it is of a firm texture, very hard, of a pale and ſomewhat reddiſh brown, and very heavy; it is of a rough unequal ſurface, adheres ſlightly to the tongue, is hard, dry, and harſh to the touch, does not break eaſily between the fingers, nor at all ſtain the hands; it melts ſlowly and diſagreeably in the mouth; thrown into water it makes very little ebullition or hiſſing, and after ſome time falls into powder.

Examin'd by the Microſcope, it appears of a looſe texture, and compos'd of a coarſe, whitiſh Sand, held together by a reddiſh brown clay.

It makes no effervеſcence with Aqua Fortis.

It burns to a fine red, but with no great hardneſs.

It is dug in Staffordſhire, Buckinghamſhire, and many other counties, and us'd in brick-making, but it makes but a very coarſe ſoft kind; it generally lies near the ſurface, and in ſome places ſhews itſelf in the roads.

SERIES I.

CLASS I. ORDER II. GENUS I.

THRUPTOMICTHES.

1. *Thruptomicthes rubra.*
Red Thruptomicthes.

This is a looſe, ſandy earth, of a very crumbly texture, and conſiderably heavy; it cuts very freely with the plough or ſpade, and while moiſt is of a very deep red in colour, perfectly looſe and rare, and never clinging to the ſpade or plough ſhare; when dry it is of a pale red, of a very looſe ſtructure, and moderate weight; it is of a rough, uneven and duſky ſurface, adheres pretty firmly to the tongue, is dry, hard and harſh to the touch, very eaſily crumbles to powder between the fingers, and ſlightly ſtains the hands; it breaks freely in the mouth, but is very coarſe and gritty between the teeth: thrown into water it makes a ſlight ebullition, and very quickly moulders into a looſe, reddiſh, ſandy powder: This is a ſoil very apt to crack in dry weather, but the cracks ſoon fill up, the earth at their ſides mouldering to powder, and falling in; in wet weather it is leſs apt to be dirty than other ſoils, as it ſoon ſoaks up the rain, and never is at all viſcid or clammy.

Examin'd by the Microſcope, it appears a congeries of a fine pale-yellow Sand, held together by a fair red clay, and interſpers'd with fragments of different ſizes, of a looſe, very red iron ore, and a conſiderable quantity of fragments of a duſky reddiſh Spar.

It raiſes a conſiderable efferveſcence with Aqua Fortis.

It burns to a looſe crumbly maſs of a fine florid red.

It is frequent in many counties, but no where more plentifully than about Rowell in Northamptonſhire; it is accounted a very fertile and good land, and particularly ſucceeds well with crops of rye, barley, or peas.

2. *Thruptomicthes fuſca, friabilis.*
Friable, brown Thruptomicthes.

This is naturally a dry, and but barren earth; it cuts eaſily with the plough, and unleſs there has been much wet before, commonly falls off from the ſhare in very ſmall lumps, or a looſe powder; when dry it is not eaſy to preſerve it in a lump; it is of a very ſpungy looſe texture, of a pale-brown in colour, and not very heavy; it is of a rugged unequal ſurface, adheres ſlightly to the tongue, is harſh and duſty to the touch, crumbles readily into powder between the fingers, and does not at all ſtain the hands; it breaks readily in the mouth, but is very hard and coarſe between the teeth; thrown into water it makes a conſiderable ebullition and hiſſing, and immediately falls into a looſe powder.

Examin'd by the Microſcope, it appears a congeries of hard particles, partly ſandy, partly ſtony, held together by a ſmall quantity of a pale-brown ſpungy earth.

It makes a briſk efferveſcence with Aqua Fortis.

It burns to a very pale red, with little additional hardneſs.

This is frequent in Suſſex, and many other parts of the kingdom, and is generally accounted a poor barren land.

SERIES I.

CLASS I. ORDER II. GENUS II.

GLOIOMICTHES.

1. *Gloiomicthes grizeo-fuſca, tenax.*
Greyiſh-brown Gloiomicthes.

This is a ſomewhat tough, and very weighty earth; it cuts very freely either with the ſpade or plough, but is apt to fall in too compact maſſes, tho' it never ſticks to the ſhare of the plough, or iron of the ſpade, but ſlides freely off from them, and is of a ſmooth, even, and ſomewhat gloſſy ſurface; when dry it is of a pale greyiſh-brown colour, much paler than while wet, conſiderably heavy, and of a moderately firm texture, but apt to be full of ſmall Pebbles; it is of a rough, rugged, but not duſty ſurface, adheres pretty firmly to the tongue, is ſomewhat unctuous, tho' harſh to the touch, breaks very eaſily into irregular pieces between the fingers, but is not eaſily crumbled to powder, and does not at all ſtain the hands; it melts pretty freely in the mouth, but is of a diſagreeable taſte, and very coarſe and gritty; thrown into water it makes very little ebullition or hiſſing, but becomes of a duſky colour, and ſoon falls into ſmall pieces, and thence crumbles to powder: This ſoil is very apt to crack and ſeparate in dry weather, and is what we call greaſy, and ſlippery after rain.

Examin'd by the Microſcope, it appears of a tolerably compact and firm texture, full of a ſmall white Sand, containing ſome larger Pebbles, and full of cavities, out of which other ſuch have fallen, which are all ſmooth and gloſſy at the bottom.

It makes no efferveſcence with Aqua Fortis.

It burns to a faint red, with a little additional hardneſs.

It is a common earth in Buckinghamſhire, Lincolnſhire, and Northamptonſhire, and is known by the farmers, I cannot gueſs why, by the name of white land.

It produces barley better than almoſt any other ſoil.

2. *Gloiomicthes luteo-fuſca ponderoſa.*
Weighty, yellowiſh-brown Gloiomicthis.

This is a hard, heavy, and ſomewhat tough earth; it cuts but diſagreeably with the plough; in dry ſeaſons 'tis ſo hard as to break off in very large maſſes, and in wet ſticks and clings to the plough-ſhare, not falling from it as the clayey ſoils do in even ſhining maſſes, but breaking roughly and irregularly; when dry it is of a deep yellowiſh-brown, of very great weight, and of a very friable looſe texture; it ſhews a rough, rugged and unequal ſurface, adheres not in the leaſt to the tongue, is dry, and harſh and duſty to the touch, very eaſily breaks between the fingers, and ſlightly ſtains the hands; it melts but ſlowly and diſagreeably in the mouth, and is very coarſe and gritty between the teeth; thrown into water it raiſes a ſlight ebullition without noiſe, and after ſome time falls into ſmall lumps, and from them into powder.

It is a very duſty and hard earth when dry, and in wet ſeaſons moſt diſagreeably ſticky and troubleſome in walking.

Examin'd by the Microſcope, it appears compos'd of a multitude of different hard particles, a brown gritty Stone, a yellow Sand, pieces of Spar, and a very glittering bright white Sand, all held together by a browniſh ſpungy earth.

It makes a conſiderable efferveſcence with Aqua Fortis.

It burns to a pale red with very little hardneſs.

It is common in Lincolnſhire, Suſſex, and Cornwall, and is accounted a tolerably rich land.

Theſe, on a nice examination, are all the Moulds I have obſerv'd that are truly diſtinct from the other foſſil bodies; but the eſſential difference of theſe is moſt plainly ſeen in their terreſtrial part, which ſerves to bind the reſt together: This may be eaſily ſeparated, and obtain'd pure by means of water, and when ſeparated appears to be of ſomething of the ſame ſtructure in all, tho' different in colour, and to be of a middle nature between Marle and Clay.

Moſt of the earths uſually diſtinguiſh'd by the name of moulds, have no right to a place in a hiſtory of Foſſils, being no other than one or other of the bodies before deſcrib'd, broken and mix'd with adventitious particles.

FOSSILS

NATURALLY and eſſentially compound, not inflammable, nor ſoluble in water; found in continued ſtrata.

Series the firſt.

Claſs the ſecond.

STONES.

Foſſils compoſing beds of great extent, hard and dry, not ſoluble in water, nor in oil, nor at all ductile; form'd either of a congeries of ſmall particles in ſome degree reſembling Sand, lodg'd in a ſmoother cementitious matter, or elſe of this cementitious matter and the Gritt or Sand-like particles run together into one ſmooth maſs, or finally of the Granules cohering by contact, and without any cementitious matter among them; compos'd of Cryſtal or Spar, uſually debas'd by Earth, and often mix'd with Talcy and other extraneous particles.

Of this Claſs there are three Orders, and under thoſe eight Genera.

In the two firſt Orders nature has left the Genera leſs diſtinct from the various admixtures of Spar, and Cryſtal, in the compoſition of the ſpecies; in the laſt they are each determinate, and afford all the common characters in all the ſpecies of each.

Order the firſt.

Coarſe, harſh and rough Stones, of a lax texture, and compos'd of a viſible Gritt, reſembling Sand in form, and uſually immers'd in a cementitious matter, and of little natural brightneſs; ſcarce capable of any poliſh, and naturally mouldering away in form of powder from the tools of the workmen.

Order the ſecond.

Stones, moderately fine, of a more compact and even texture, and ſcarce diſtinguiſhable conſtruction, affording no Sand-like particles to the view; of ſome natural brightneſs, and capable of a tolerable poliſh, and flying off from the workmens tools in form of ſmall chips.

Order the third.

Stones, of a fine ſubſtance, and elegant ſtructure, naturally of a great brightneſs, and capable of an elegant poliſh, compos'd of Granules of various ſhapes and ſizes, but uſually flattiſh, ſometimes more, ſometimes leſs diſtinct, and in ſome ſpecies run together into uniform maſſes, but never lodged in any cementitious ſubſtance.

STONES.

Order the firſt.

Genus 1. PSADURIA. *Rough Stones, of a plain uniform ſtructure, not laminated, but ſplitting equally in any direction.*

Genus 2. AMMOSCHISTA. *Rough Stones, of a laminated ſtructure, and ſplitting only horizontally, or into flat plates.*

STONES

STONES.

Order the ſecond.

Genus 1. SYMPEXIA. *Finer Stones, of a plain uniform ſtructure, and ſplitting with equal eaſe in any direction.*

Genus 2. STEGANIA. *Finer Stones, of a laminated ſtructure, ſplitting only horizontally, or into thin plates.*

STONES.

Order the third.

Genus 1. MARMORA. *Stones, compos'd of ſmall ſeparate concretions of great Brightneſs, and an elegant ſtructure, moderately hard, not giving fire with ſteel, fermenting with acid Menſtrua, and ſoluble in them, and calcining in a ſlight fire.*

Genus 2. ALABASTRITÆ. *Stones, compos'd of large ſeparate concretions of great brightneſs, and an elegant but ſhattery ſtructure, not very hard, not giving fire with ſteel, fermenting with and ſoluble in acids, and calcining in a ſlight fire.*

Genus 3. PORPHYRITÆ. *Stones, of a plain uniform maſs, but ſpotted with ſeparate concretions; of great hardneſs, giving fire with ſteel, not fermenting with acids, and very ſlowly and difficultly calcining even in a great fire.*

Genus 4. GRANITÆ. *Stones, compos'd of ſeparate very large concretions, rudely compacted together, of great hardneſs, giving fire with ſteel, not fermenting with acids, and very ſlowly calcining in the largeſt fire, and then but imperfectly.*

SERIES I.

CLASS II. ORDER I. GENUS I.

PSADURIA.

Coarſer Stones, of a laxer texture, not laminated, but ſplitting with equal eaſe in all Directions.

SECT. I. PSADURIA, conſiſting of pure Cryſtal, and Spar, without any admixture of heterogene particles.

1. *Pſadurium ſplendidum, albidum, fragile.*
Bright, whitiſh, brittle Pſadurium.

THIS is a coarſe, harſh and rough Stone, of a looſe open texture, and very porous; it is moderately heavy, and externally of a duſky dead white, but very glittering and ſparkling where freſh broken; it is compos'd of a large angular cryſtalline Gritt, very pure and clear from all mixture; it is very hard and firm in the maſs, but reduc'd into ſmall pieces it eaſily crumbles like a lump of ſugar between the fingers, and falls into a fine white Sand like powder, while in the earth it is ſomething moiſter, and more crumbly, eſpecially toward the ſurface, than when it has lain to be ſeaſoned, as the workmen call it, that is, to have its natural humidity evaporate in the air; it is generally lodg'd in thick ſtrata, with tolerably regular ſurfaces, and found pure, being leſs frequently ſeen with ſhells embodied in it than moſt others.

Water pour'd on it almoſt immediately pervades and ſinks thro' it.

It very readily ſtrikes fire with ſteel.

Is not eaſily cut, and ſoon blunts the workmens tools, falling from them in form of powder, not in chips.

Examin'd by the Microſcope, it appears a looſe and incoherent congeries of a perfectly white and very ſhining Gritt, the particles are all angular tending to an oblong ſhape, and full of very glittering angular ſpecks in ſome places; theſe ſeem laid together irregularly, and without the intervention of any thing by way of cement; the Stone compos'd of them ſeeming to have ow'd its coaleſcence merely to this, that its conſtituent matter having firſt concreted into theſe Granulæ which we call its Gritt, they ſunk together in the fluid they were form'd in, and before they had acquired their proper hardneſs, preſſing upon one another, coher'd wherever they came in contact. This their natural ſhape prevented them from doing in more than a part of their ſurfaces, and hence the cavities and interſtices between the ſolid parts, thro' which water ſo eaſily finds its way.

It makes not the leaſt effervescence with Aqua Fortis.

It burns to a beautiful pale red.

I have obſerv'd it in Dorſetſhire, Northamptonſhire, and Yorkſhire; it generally lies deep, and under other ſtrata of Stone; it is always full of ſmall perpendicular fiſſures which are ever empty, and are called by the diggers, cricks and dry joints; this ſpecimen has two of them within the ſpace of an inch; beſide theſe, the ſtrata are ever divided in the quarry by larger fiſſures into what the workmen call ſtacks and benches of Stone; theſe larger fiſſures are commonly empty alſo in this ſpecies, and their ſides very even and regular.

It is uſed in building, and bears the weather well, and without ſweating as they call it, but will not take a poliſh: In Northamptonſhire there are walls frequently built with it without mortar.

2. *Pſadurium hebes, albido-griſeum, fragile.*
Dull, greyiſh white, brittle Pſadurium.

This is a coarſe, rough Stone, of a looſe but not open texture, and viſibly irregular in its ſtructure, tho' no where abſolutely porous; it is conſiderably heavy, of a duſky greyiſh white, and perfectly dull and deſtitute of ſplendour; it is compos'd of a large and ſeemingly miſhapen Gritt, envelop'd every where by a ſoft, looſe ſubſtance, in form of powder; it is conſiderably hard in the maſs, and when broken into ever ſo ſmall pieces, retains the natural coherence of its particles, and will not be rubb'd into powder, or looſe Sand like the former between the fingers.

It ſtains the fingers in handling; and water poured on it, ſoon pervades its ſtructure, and wets it thro'.

It will not without great difficulty be made to ſtrike fire with ſteel.

It cuts tolerably eaſily, but flies off from the tools in chips, not in form of powder.

It makes a violent effervescence with Aqua Fortis.

It burns to a purer white, but with a faint bluſh of fleſh-colour.

Examin'd by the Microſcope, it appears on an accurate inſpection compos'd of an angular, oblong and large Gritt, perfectly pellucid, and cohering in a few places one Granulæ to another; theſe are abſolutely cryſtalline, and are every where ſurrounded with, and the ſpaces between them fill'd up either by a coarſe whitiſh farinaceous powder, or a cement compos'd of it.

While in the earth, it is very moiſt and crumbly; it generally lies deep, and under other ſtrata of ſtone, and is ſeldom found containing ſhells; it is of conſiderable uſe in building, bears the weather very well, and carves eaſily, but will not take any tolerable poliſh; the arms and images on and before houſes in Northamptonſhire and Dorſetſhire, and other counties, are frequently cut in it.

I have obſerved it in many counties: this ſpecimen was from Cliff in Northamptonſhire, where it lay at about 23 feet deep under other Stone, Clay, Sand and vegetable Mould; the ſtratum of it was at leaſt five foot thick, and divided into ſtacks by very wide but empty perpendicular fiſſures or gullies as they are there called; the ſides of theſe were very even, but often cover'd with the white Marle heretofore deſcribed. At about 200 yards diſtance from this pit there is another, where at the very ſame depth, and in a ſtratum of the ſame thickneſs, the Stone before deſcrib'd is found; this obſervation engaged me in very nice examinations of the difference of the two, the reſult of which is, that this abſolutely owes its origin to the other, and only differs from it in having the cavities between the Granules, which are empty in that, fill'd up in this with a ſparry cement.

It is to this alone it owes all its different qualities; its firmer texture is from the cement acting as mortar in a wall, and making the cryſtalline Granules cohere in all points inſtead of a few only; it becomes of a leſs porous texture by the interſtitial cavities being filled up with this; its encreaſe of weight is from this addition of more matter in the ſame bulk, its dullneſs is owing to this matters covering the gloſſy ſurfaces of the cryſtalline Granulæ, and its not ſo eaſily ſtriking fire with ſteel from the ſame cauſe; this adventitious matter alſo makes it burn whiter, as that is the natural colour Spar calcines to; and the great difference in the effect of acids on them is yet a farther and unanſwerable proof, inſtead of an objection as it might at firſt appear, to their being as here the ſame thing, empty of, oppos'd and ſated with extraneous matter; for a ſmall quantity of this thrown into Aqua Fortis, and freſh acid added till the effervescence ceaſes, depoſits the cryſtallize Granulæ clean, pure, and unalter'd, the acid having only taken up the extraneous ſparry matter, and left them pure and clean.

Theſe will now no longer make any efferveſcence with acids.

And view'd by the Microſcope, they appear evidently the very ſame with the Granulæ of the former ſtone.

From theſe accounts we may begin to form ſome ideas of the true cauſe of that abſtruſe and hitherto ever miſunderſtood problem, the coheſion in Stones; in the former of theſe we ſee cryſtalline matter naturally concreting into ſomething very like regular cryſtalline figures, and theſe meeting before they were abſolutely harden'd, and cohering wherever they came into contact in that ſtate: it is eaſy to infer, that theſe original concretions of Granulæ could not have happened but in a fluid, and that therefore there was no time for the formation of this Stone, but when a fluid ſaturated with ſuch particles covered the ſurface of the earth where it now lies; this therefore it ſhould ſeem could only be form'd at the time of the creation, or univerſal deluge, and that no Stone of this kind can ever be form'd at this time, or can have been at any time ſince.

The other we ſee ab origine abſolutely the ſame, but envelop'd in, and every where full of an extraneous matter, an earthy Spar, looſe enough to rub off upon the fingers in handling; yet giving the maſs great ſtrength, performing the office of a cement, and making great changes in the concrete, tho' no way affecting the Granulæ themſelves.

This Spar is a ſubſtance ſuſtained in all water and ſeparable from all by evaporation, and other methods; it may either therefore, as is moſt probable, have been ſuſpended in immenſe quantities in water, and nearly in the point of ſeparation from it, and coaleſceing into a maſs, and that in the very water in which the concretion of this Stone happened, and ſo be intimately mixed or made a part of it as we ſee it; or poſſibly the Stone may have originally coaleſced in purity; and this whole introduction of extraneous matter into its cavities have happened ſince, by water loaded with Spar pervading its ſubſtance, and leaving continually a part or all of that matter behind it in its pores, and ſurrounding its Granules; and thus the Stone may have obtained its preſent mode of exiſtence of later times, tho' ever either from the creation, or deluge, a Stone.

Let not this ſyſtem be miſunderſtood to favour, or at all authorize the general error of ſuppoſing ſtrata of ſtone to be form'd at this day out of Sand, Clay, &c. Sand originally looſe can by no agent now in force be ever made to coaleſce into Stone, nor can any cement take place in effecting this: Clay and Sand can make only Loam; and Spar, and Sand, unleſs that Sand have originally coaleſced one Granule with another can only be a looſe powder; water impregnated with this body falling on a ſtratum of Sand, finds free and open paſſage, and runs thro' without depoſiting any part of its contents; were it not thus, as water thus impregnated is daily running thro' ſuch ſtrata, we muſt daily expect to ſee ſtrata of ſtone of our common yellow Sand concreted by means of it; whereas, on the contrary, I never yet ſaw any one ſpecimen of Stone, the Gritt of which agreed with any of theſe common Sands.

I am ready to believe, indeed, that Stone may be reduc'd to a ſubſtance reſembling Sand by the pervaſion of water, and that many of the Gritts before deſcrib'd are owing to Stone: the Spar of theſe, that had ſerv'd as their cement, has been in courſe of time perhaps waſh'd away, and the Gritt left looſe, the Stones having originally ow'd their concretion to a maſs of their Granulæ falling looſe into a half conſolidated bed of Spar; and that thus a ſort of Sand is often produc'd at leaſt as to its mode of exiſtence at this time, and that Stone is daily converted into Sand, if that Gritt may be ſo call'd; tho' no obſervations I have ever made, can at all authorize the believing, with the generality of the world, that Stones are produc'd at this time, or that Sand is, or ever can be, in the preſent ſtate of things, turn'd into ſtone.

The obſervation that the pure Gritt of Stones, which are alkaline in the concrete, makes no effervefcence with acids after the Spar has been thoroughly diſſolv'd from it, is at once a ſolution for a phænomenon that ſtartled me at firſt among the Saburræ or Gritts, which is, that many of them, tho' evidently the Gritt of alkaline Stones, are themſelves neutral in acids; for as many of theſe concretes owe their alkaline qualities to the Spar they contain, and water is an abſolute diſſolver of Spar, as well as Aqua Fortis, tho' more ſlowly, it is no wonder that the two menſtruums ſhould have the ſame effect; and that tho' a ſtone was in the concrete ſtrongly alkaline from the Spar it contain'd, yet the ſame Agent that reduc'd it to a Saburra or looſe Gritt, being a diſſolvent of Spar, may, in length of time, and during the proceſs of its transformation, as abſolutely diveſt it of its Spar, and leave it as pure as the Aqua Fortis does the Granules of this Stone; and this may be underſtood to hold true in all thoſe Gritts, the original Stones of which had the Spar in their compoſition, not mix'd in, but only ſurrounding and enveloping their cryſtalline particles, and that thoſe form'd of Stones, in which Spar was originally incorporated in the very matter of the Granules, muſt continue ever to ferment with acids, till thoſe very Granules are diſunited, and reduc'd, like the Stone in former proceſs, to their conſtituent particles.

3. *Pſadurium hebes, album, durius.*
Hard, white, dull Pſadurium.

In the two former ſpecimens I have deſcrib'd a pure cryſtalline Stone, and an impure one, render'd ſo by extraneous matter filling its cavities, and ſurrounding its particles; here a third kind is to be explain'd, conſiſting of cryſtalline Granules, themſelves impure, and cemented by a purer or finer matter, a cryſtalline, not an earthy Spar.

This Stone, which I have choſen, as carrying the plaineſt marks of this compoſition, is very coarſe and rough, of a cloſe, denſe, compact texture, and very hard, conſiderably heavy, and of a fair good white, but abſolutely dull, and deſtitute of brightneſs; it is compos'd of a large and irregularly angular Gritt, ſurrounded by, and its interſtices fill'd up with a ſtony (not a looſe or lax duſty) matter, or impure cryſtalline Spar; the quantity of cryſtal in this is, however, ſo ſmall in proportion to the whole, as to be diſcoverable only by the firmneſs of its texture, there being too little of it to give any great brightneſs: This Stone is very hard and firm in the maſs, and when broken into ſmall pieces, is not at all to be crumbled between the fingers, nor in the leaſt ſtains them in handling.

Water pour'd on it enters its ſubſtance but very ſlowly.

It will not eaſily ſtrike fire with ſteel.

It cuts very evenly, and flies off from the tools in ſmall chips.

It ferments very ſtrongly with Aqua Fortis.

It burns to a pure white.

Examin'd by the Microſcope, it appears, on a ſlight view, a coarſe white ſpungy maſs, of a duſty ſurface, with a few brighter parts than the reſt; but examin'd in a ſtrong light, and with more powerful magnifiers, it is diſcover'd to be compos'd of a number of particles of a pale yellowiſh-white, ſemi-pellucid, of dull, not ſhining ſurfaces, and in ſhape obtuſely angular, and between oblong and ſquare: Theſe are properly its Gritt, and they coaleſce in certain points, where they come in contact like thoſe of the before deſcrib'd, but their Interſtices are every where fill'd up, and their ſurfaces ſurrounded with a much coarſer matter of the ſame kind with themſelves; this is an earthy Spar, with a ſlight admixture of cryſtalline particles, which keep it firmly together, prevent it from falling off in form of powder, or ſtaining the hands on touching, and make it a ſtrong and hard cement, holding together the diſtant parts of the Granulæ of the Gritt, almoſt as ſtrongly as they hold one another where in contact, and making the Stone very conſiderably hard; not only the cementitious matter, as I ſhall hereafter call the interſtitial particles of ſtone, but the very Granulæ of the Gritt itſelf are, in this inſtance, compos'd of cryſtal debas'd by a great admixture of Spar; this however has been done but irregularly, for the Spar is, in ſome parts of the cement, almoſt wholly without cryſtal, and there are many ſpecks of pure cryſtal in the Granulæ, tho' theſe are, in moſt of their ſubſtance, full of Spar. The original coaleſcence of this Stone ſeems therefore to have been thus: a quantity of cryſtalline and ſparry matter muſt have been concreting in the ſame place in the fluid they were ſuſpended in, the cryſtalline taking up ſome of the Sparry into it, has concreted into mix'd Granulæ, with clear Spar in ſome parts, and clear Cryſtal in others; but in moſt a cloſe mixture of both: theſe Granules have coher'd wherever they came into contact, and were probably afterwards cover'd by a ſediment of a thin coaleſcing coarſer Spar, tho' with ſome Cryſtal embodied in it alſo, which ſoon fill'd up the interſticial ſpaces, and ſurrounded and adher'd to the Granules every way, and became a firm cement to them; nor is this Syſtem to appear with the air of a conjecture only, for obſervation and experiment ſtrongly confirm it; the upper part of this ſtratum is always much ſofter than the lower, and wholly without Granulæ, compos'd merely of the cementitious matter that remain'd above it; and Aqua Fortis, tho' it perfectly diſſolves the cement of the former, and is not able to touch its Granules, here, on the contrary, leaves a ſmall quantity of untouch'd matter from the cement, and abſolutely breaks and diſſolves a great part of the Granulæ themſelves, but leaves a much greater quantity of cryſtalline matter from theſe than the other: I am ſenſible that nothing is more miſunderſtood at preſent than the origin of Stones, and am well convinc'd that the novelty of what I have to advance in regard to that abſtruſe point, will be a ſtrong reaſon for its not being agreed to; but as I ſhall proceed by ſlow and cautious degrees, and advance nothing on bare conjecture, I flatter myſelf the learned world will be as willing to allow me all proofs from obſervation and experiment, as I to deſire it, and I ſhall not preſume to advance any thing on any other foundation.

This Stone is common in Dorſetſhire, and ſome other counties; it generally lies at leſs depths than many others, and commonly makes the upper ſtratum; it ſeldom holds ſhells, or other extraneous bodies, and is commonly very full of narrow perpendicular fiſſures.

It is an excellent ſtone for building.

4. *Pſadurium hebes, albidum, laxius.*
Looſe, dull, whitiſh Pſadurium.

This is a very coarſe Stone, of an irregular ſurface and very lax texture; it is but moderately heavy, of a dull dead white, and compos'd of a very large roundiſh Gritt, cemented together by an earthy Spar; it is but friable in the maſs, and when reduced to ſmall pieces, eaſily crumbles to powder between the fingers; water poured on it, readily pervades its ſurface.

It will not ſtrike fire with ſteel.

It makes a violent efferveſcence with Aqua Fortis.

It burns to a ſomewhat reddiſh white.

Examin'd by the Microſcope, it appears compos'd of a congeries of roundiſh Granulæ, no one of them at all angular in any of its ſurfaces, and all very opake; theſe are thrown very cloſely together, but as bodies of this figure can come into contact only in a few points, the ſpaces between, and among them, are large; they no where cohere where they touch, but are cemented together by an earthy Spar, which ſurrounds them, and fills up many of their interſtitial ſpaces, tho' many others remain, in a great meaſure, empty; its coaleſcence ſeems to have been owing to a multitude of theſe Granulæ falling together when too hard to cohere on contact, into a bed of half concreted Spar; the Granulæ themſelves, in this Stone, contain a great quantity of Spar alſo, for Aqua Fortis works on them, and almoſt entirely diſſolves them.

It is brought in great abundance to London from Portland, and is in common uſe in building.

This, and moſt of the other Stones in this claſs, while in the earth, are moiſt, and have their pores full of water; this makes them conſiderably ſofter than when they have been ſome time expos'd to the air, and that humidity has flown off; in many places people cut them on the ſpot, to take advantage of this ſoftneſs, and ſend them away in the form they want them in; if it be us'd immediately from the quarry, it generally cracks and burſts with froſts, from the moiſture it contains; if ſuffer'd to dry firſt, it becomes greatly more durable.

5. *Pſadurium griſeum, durius.*
Hard, greyiſh Pſadurium.

This is a Stone of different ſtructure from either of the before-mention'd; its Granulæ, tho' they come in contact in many places, no where cohering at all, but owing their coaleſcence in this form entirely to a terrene Spar, which ſerves them for a cement.

It is a very hard, harſh, rough ſtone, of a firm texture, but yet appearing ſomewhat porous; it is extreamly heavy, of a diſagreeable greyiſh colour, and if attentively view'd where freſh broken, has ſome glittering particles; it is compos'd of a moderately large Gritt, of an obtuſely angular ſhape, held together by a compact greyiſh terrene Spar; is not to be crumbled, when broken in ſmall pieces, by rubbing between the fingers, nor is at all duſty, or apt to ſtain them in handling; water pour'd on it pervades its ſubſtance but very ſlowly.

It will not ſtrike fire with ſteel.

It cuts difficultly, and flies off in chips.

It makes a violent effervеſcence with Aqua Fortis.

It burns to a white colour.

Examin'd by the Microſcope, it appears, at firſt ſight, a looſe irregular ſpungy Stone, but view'd more attentively is diſcover'd to be compos'd of Granulæ of an oblong angular ſhape, many of them purely cryſtalline, and very bright and glittering, (theſe are the lucid ſpecks in the ſtone) and many others ſemi-opake and whitiſh, compos'd of Cryſtal, and a ſmall admixture of Spar: theſe come into contact in much fewer places than the Granulæ of the other Stones, and even where they do, are eaſily ſeen not to cohere at all; the ſparry matter ſurrounding theſe Granulæ, and filling up their interſtices, is very firm, compact, and hard, and in ſome degree pellucid; it makes an excellent cement, and renders the Stone very firm and hard, making ſuch a ſort of mixture as lime and ſand in mortar, but it does not exactly fill all the interſtices, whence the ſlight poroſity of the ſtone.

It is common in many counties, but the great quantity brought to London is from Purbeck: I have frequently obſerv'd it in Yorkſhire; it generally lies in very thick ſtrata, and at conſiderable depths, and often contains ſhells, but thoſe generally of the ſmaller kinds; it lies in large courſes or beds, as the diggers call them, the perpendicular fiſſures in its ſtrata being fewer than in many others.

It is a good building Stone, but will take no great poliſh.

Its manner of coaleſcence ſeems to have been, that a bed of ſparry matter, newly ſubſided, and juſt concreting, lying under the place where a quantity of impure cryſtalline matter was concreting into Granulæ, this when form'd fell on and naturally ſunk into it: All the obſervations I made in Yorkſhire confirm this, the lower parts of the ſtrata ever containing a larger quantity of the cryſtalline Granulæ than the upper, and being much more hard and compact, Aqua Fortis breaks the ſubſtance of the Gritt, and takes up almoſt the whole of the cementitious matter.

The Stones hitherto deſcrib'd, as alſo many of the following, have ſparry matter for their cement; we ſhall ſee hereafter, however, that particles of many other kinds can ſerve to the ſame purpoſe, and make an equally ſtrong band of union.

6. *Pſadurium friabile, albido fuſcum.*
Friable, browniſh-white Pſadurium.

This is a very coarſe, harſh, and rough Stone, of a lax texture, and ſomething porous; it is but moderately heavy, of a duſky browniſh-white, and perfectly dull, and without brightneſs; it is compos'd of a large angular Gritt, but ſlightly held together by a cementitious matter of an earthy Spar; it is but friable in the maſs, but when reduc'd to ſmall pieces is eaſily crumbled to powder between the fingers; it ſtains the hands in touching, and admits water very freely into its pores.

It

It will not ſtrike fire with ſteel.

It makes a violent effervеſcence with Aqua Fortis.

It burns to a pale reddiſh white. The maſſes of this Stone are frequently interſected in various directions, with plates or veins of a purer and whiter Spar.

Examin'd by the Microſcope, it appears a congeries of obtuſely angular Granulæ, debas'd from their cryſtalline purity in moſt places by an admixture of Spar; theſe cohere no where, tho' they frequently come into contact, but are lodg'd in a cementitious matter of an earthy Spar, which is alone the cauſe of the coheſion of the maſs.

It is common in many parts of the kingdom, but the quantities brought to London, for uſe in building, are from Portland; it cuts eaſily, and is a very uſeful Stone in building, bearing the weather well, and not being ſubject to ſweat, as it is call'd in pavements.

The Granulæ, as well as the cement of this Stone, are diſunited by Aqua Fortis, and when free from the cementitious matter, continue to ferment with it, whence it is evident that they have Spar in their conſtitution. The veins of Spar in this Stone are what have been narrow, perpendicular, and angular fiſſures in the ſtratum, fill'd up in time with that ſubſtance.

7. *Pſadurium friabile, granulis rotundis.*
Friable Pſadurium, with a round Gritt.

This is the ſubſtance ſo much talk'd of in the world, under the name of the Kettering Stone, tho' that is an erroneous name, it not being found about Kettering in Northamptonſhire, but about Ketton in Rutland.

It is a very remarkable and beautiful Stone; it is of a lax texture, and appears, where broken, of a cavernous or porous ſtructure; but this is not really the caſe, the cavities ſeen there being not originally in the Stone, but made by falling out of the inner part of its Gritt, which is uſually looſe, and falls out as ſoon as its containing ſhell is broken; it is moderately heavy, and has very little brightneſs; it is in colour of a duſky browniſh white, and is compos'd of a roundiſh Gritt, laid very cloſely together, and ſurrounded with a cementitious matter of a terrene Spar; it is tolerably compact in the maſs, but when reduc'd to ſmall pieces may be crumbled between the fingers; it does not ſtain the hands in touching; water pour'd on it pretty readily finds the way into its pores.

It will not ſtrike fire with ſteel.

It ferments violently with, and is in great part diſſolv'd by Aqua Fortis.

It burns to a pale-whitiſh colour.

Examin'd by the Microſcope, its cementitious matter appears a conſiderably coarſe terrene Spar, and its Granules are all true Stalagmitæ, or ſmall cruſted ſparry bodies; the outer coats of which adhere ſo very ſlightly one to another, that they uſually ſeparate on breaking: The particular ſtructure of theſe bodies having been already deſcrib'd among the Stalagmitæ, need not be repeated here.

It is not only found about Ketton in Rutland, but in many other parts of the kingdom, and is us'd in many places in building.

SECT. II. Impure Pſaduria, conſiſting of ſparry, cryſtalline, and talcy particles.

1. *Pſadurium fragile, ſcintillans, albido-vireſcens.*
Greeniſh-white, brittle, glittering Pſadurium.

This is a coarſe and duſty Stone, its particles cohering ſo ſlightly as to be continually falling off in form of powder; it is of a lax, open texture, moderately heavy, and in colour of greyiſh-white, with ſome faint admixture of greeniſhneſs; it is full of a number of glittering ſpangles of a foliaceous Talc, and compos'd, beſide theſe, of a moderately large angular Gritt, ſurrounded by a very lax and coarſe earthy Spar; It is very ſoft, and eaſily broken in the maſs, and when reduc'd to ſmall pieces, readily moulders to powder between the fingers, and a little ſtains the hands in rubbing; water pour'd on it readily pervades its ſtructure, and wets it thro'.

It will not eaſily ſtrike fire with ſteel.

It cuts very eaſily with the Maſons tools, and moulders away from them in ſmall rugged chips, or in form of powder.

It makes a violent effervescence with Aqua Fortis.

It burns to a ſomething reddiſh white.

Examin'd by the Microſcope, it appears, at firſt ſight, a looſe ſpungy duſty maſs, but on ſtrict inſpection is ſeen to be compos'd of a cryſtalline Gritt, lodg'd in a looſe duſty Spar, and adorn'd with ſmall flakes of a foliaceous Talc; the cryſtalline Granulæ are very pellucid, and of ſmooth ſurfaces, ſcarce coming any where into contact, and plainly not at all cohering where they do; the Spar that ſurrounds and ſeparates them is not collected or concreted into a maſs, but is in looſe ſmall particles, cohering to themſelves and to the cryſtalline Granulæ but very ſlightly, and even this ſmall coaleſcence is often broke in upon by the intervention of the talcy particles which adhere to nothing; ſo that, crumbly as this Stone is, the Microſcope makes it wonderful that it is not much more ſo, it ſeeming wonderful how it hangs at all together.

It is common in almoſt every county of England; I remember much of it in Yorkſhire, where it lies in thick ſtrata, very ſoft, and divided from the ſtrata above and below it by very wide horizontal cracks, half full of its own looſe Gritt, and generally broken into narrow ſtacks by a number of wide perpendicular fiſſures, commonly fill'd up with Clay or Sand, and a little of the looſe Gritt of the Stone at the bottom: I have made it an obſervation, that there are fewer of the ſmall cracks, which the workmen call cricks, and dry joints in this, and the other looſe Stones, than in thoſe of a cloſer texture.

It is a common Stone in uſe in all parts of England; it cuts eaſily, but takes no poliſh, and bears fire better than many harder Stones.

2. *Pſadurium durius, albido-griſeum, ſcintillans.*
Hard, greyiſh-white, ſhining Pſadurium.

This is a very coarſe, hard, harſh and rough ſtone, of a firm texture, but in ſome degree porous, very heavy, and of a duſky greyiſh or browniſh white, ſpangled all over with broad glittering flakes, of a foliaceous Talc, and in ſome places variegated with ſpots of brown; it is compos'd of a large irregularly angular Gritt, lodg'd in a cryſtalline cementitious matter, and every where ſtuck full of flakes of Talc, and its cavities fill'd, and Granules ſurrounded with a ſparry ſubſtance in form of duſt; it is conſiderably hard in the maſs, but when reduc'd to ſmall pieces, may be crumbled to powder between the fingers; it ſtains the hands in touching, and admits water very freely into its pores.

It will not ſtrike fire eaſily with ſteel.

It makes a ſlight effervescence with Aqua Fortis.

It burns to a pale reddiſh white.

Examin'd by the Microſcope, it appears a looſe, ſpungy and duſty maſs, compos'd of a number of cryſtalline, bright and tranſparent Granulæ, laid pretty cloſely together, and cohering wherever they touch, between and among many of theſe there runs an irregular cementitious matter, of the ſame texture with the Granulæ; and among theſe are interſpers'd a vaſt number of flat, talcy particles, and the interſtitial cavities are fill'd up with fragments of Spar in form of a coarſe powder; 'tis theſe particles only which ferment with the Aqua Fortis, for after repeated affuſions of that Acid, the Stone is found unalter'd in all reſpects, but that of the loſs of this powder which the Acid has taken up.

I found a large ſtratum of this in Yorkſhire, lying very near the ſurface, and divided by very few perpendicular fiſſures; it is dug alſo in many other places and brought up to London, where it is much us'd in building; it cuts eaſily, and takes a very tolerable poliſh.

3. *Pſadurium friabile, e flavo-ſubfuſcum, ſcintillans.* *Yellowiſh-brown, friable, glittering Pſadurium.*

This is a very coarſe, looſe and harſh Stone, of a lax texture, and porous; it is conſiderably heavy, of a duſky browniſh and ſomewhat yellowiſh white, and very full of glittering fragments of a foliaceous Talc; it is compos'd of a large angular Gritt lodg'd in a duſty cementitious matter, and interſpers'd with the talcy ſpangles; it is but ſoft and friable in the maſs, and when in ſmall pieces is eaſily crumbled to powder between the fingers, that is, it is eaſily diſunited from its cement; for it is not to be ſuppos'd, the Gritt or Granulæ which compoſe the maſs of this or any other Stone can be ever comminuted by ſo ſlight a force; it duſts the hands in touching, and admits water very freely into its pores.

It will not readily be made to ſtrike fire with ſteel.

It makes a very ſlight efferveſcence with Aqua Fortis.

It burns to a pale red.

Examin'd by the Microſcope, it appears a looſe, ſpungy, duſty maſs, compos'd of diſunited, obtuſely angular cryſtalline Granulæ, interſpers'd with talcy particles in abundance, and lodg'd in a cementitious matter compos'd of a cryſtalline ſubſtance, ſo greatly debas'd by a large admixture of a yellowiſh earth, as to have loſt all its brightneſs and tranſparency; the Granulæ no where cohere, ſcarce any where come into contact, and are but ſlightly held together by this coarſe cement, whence the friability and little coheſion of the Stone; the cavities between theſe, not fill'd up with this matter, contain a ſmall quantity of Spar in form of powder; this alone it is that ferments with acids, and repeated affuſions of them affect no other part; its burning red is from the yellow earth embodied in the cement, for the Microſcope ſhews that the Granulæ themſelves remain white after burning; it ſeems probable that a maſs of this cement ſubſiding together, receiv'd the concreted and already hard particles of the Granulæ, and together made this friable maſs.

It is common in Northamptonſhire, Leiceſterſhire, Yorkſhire, and many other parts of England.

It is us'd in building, becauſe it is cheap, and cuts eaſily, but it does not bear weather well.

4. *Pſadurium friabile, pallide fuſcum.* *Friable, pale brown Pſadurium.*

This is an extreamly coarſe, rugged and rough Stone, and extreamly harſh to the touch; its particles cohere but very ſlightly, and eaſily rub off from it in form of powder; it is of a ſomewhat cavernous and ſpungy ſtructure, and is moderately heavy, and of a pale whitiſh brown, variegated with a few glittering ſpangles of a foliaceous Talc; but theſe are in ſmaller number than in moſt other of the ſpecies that have them.

It is compos'd of an oblong and obtuſely angular Gritt, ſurrounded and held together by a very coarſe and debas'd cryſtalline matter, which contains ſo much earth as to be but of a very duſky hue, and make but a very lax cement to the granules.

It is ſoft and friable in the maſs, and when reduced to ſmall pieces is readily crumbled to powder between the fingers; water poured on it, readily pervades its ſtructure.

It is too ſoft to ſtrike fire with ſteel.

It makes no efferveſcence with Aqua Fortis.

It burns to a ſomewhat reddiſh white.

Examin'd by the Microſcope, it appears compos'd of a ſmall number of Granulæ, immers'd in and cloſely ſurrounded by a debas'd cryſtalline cement, which is much purer in ſome parts of the Stone than others, and ſeems every where debas'd by a browniſh yellow earth.

In ſome parts of the ſtrata of this Stone, this is extreamly more diſtinguiſhable than in others, and the Stone appears ſo much the coarſer, and is the more lax and crumbly for it.

It is dug in many parts of England, particularly in the Northern counties; and in the harder parts of the ſtratum, makes the common rough whetſtones ſold in London for whetting ſhoemakers knives and the like; and in the coarſer parts is ſometimes cut into grinding Stones, and is one of the Stones ſent to London in that form.

5. *Pſadurium durius, rubrum, ſcintillans.*
Hard, red, glittering Pſadurium.

This is a coarſe, rough Stone, but of a very cloſe and firm texture, and capable of a tolerable poliſh; it is remarkably hard and heavy, of a ſtrong deep reddiſh brown, and full of glittering ſpangles of Talc; it is compos'd of a large Gritt, of an oblong angular form, interſperſed with a ſparry matter of its own colour, concreted into a firm maſs, and ſerving as a cement of great ſtrength to the Granulæ; it is very hard and ſtony in the maſs and even in the ſmalleſt pieces, is not to be rubb'd to pieces between the fingers, nor at all ſtains the hands; water pour'd on it ſcarce at all pervades its ſurface.

It will not eaſily ſtrike fire with ſteel.

It is very difficultly cut, and flies off from the tool in ſmooth chips.

It makes a very ſlight efferveſcence with Aqua Fortis.

It ſuffers ſcarce any change in the fire.

Examin'd by the Microſcope, it appears a congeries of angular Granulæ crouded very cloſely together, and cohering in many places; their interſtices, which are ſmaller than in moſt other of the Pſaduria, are fill'd up with a cryſtalline Spar of the ſame colour with the particles it ſurrounds, and of ſome degree of tranſparency; in this there are lodg'd in different places many ſpangles of a fine white foliaceous Talc; the whole makes a very pretty appearance, and the ſparry matter being ſo compact, proves a cement of ſuch hardneſs as to make the Stone, tho' of this coarſe Gritt, little inferior in ſtrength to marble.

I found a ſtratum of it near Briſtol, where it might be dug to advantage, tho' it is not regarded; it lay in a thin ſtratum, but divided by very few perpendicular fiſſures; what there were, were all of the larger kind, and all empty, which is not ſo common as to find them fill'd up; at ſome diſtance from this place, and at the ſame depth I found one of the Saburræ quite looſe and free, which is deſcrib'd in its place, and is evidently the Gritt of this Stone, and was all exactly of the ſame colour and ſize; but ſuppoſing it to have been once concreted, as in this Stone, the water pervading it afterwards, and waſhing away its Spar, would not be alone of force to diſunite the maſs; the Granulæ themſelves cohere in ſo many places, and that ſo ſtrongly to appearance, that there muſt be ſome more powerful agent to have diſunited them; it ſeems therefore moſt probable, that that Gritt has been ab origine looſe; that the Stone was compos'd of ſome of this concreted cryſtalline matter, which fell together when firſt form'd into Granules, and yet moiſt and ſo coher'd wherever it touch'd, and the Gritt of other of the ſame matter, which ſubſided not together from the different circumſtances of the fluid, till perfectly concreted, and too hard to cohere on touching; there is Spar in ſome degree in the very Granulæ of this Stone, for Aqua Fortis breaks them, and takes up a part of their conſtituent matter.

This, and another of the ſame colour, to be deſcrib'd in its proper place, are brought to us in great quantity from Norway, and us'd in pavements; the other is capable of a better poliſh than this, but is apt to ſweat in damp weather, which this is not; they are both often found containing ſhells.

6. *Pſadurium duriſſimum, ferrugineum, ſcintillans.*
Hard, glittering, ferrugineous Pſadurium.

This is a moderately fine Stone, of a very firm, compact texture, and of great hardneſs, and remarkable weight; it is of a duſky colour, ſeemingly compos'd of purple, brown, and yellow, but in the whole much approaching to that of ruſty iron, ſometimes yellower, ſometimes browner, and ſometimes redder in the different parts of the ſame ſtratum, and is very beautifully ſpangled with glittering flakes of a white foliaceous Talc; it is compos'd of a ſmall roundiſh Gritt, ſurrounded with, and held together by a firm, deep-brown earth; it is remarkably hard and firm, and not to be crumbled in ever ſo ſmall pieces; water pour'd on it ſcarce at all pervades its texture.

It will not eaſily ſtrike fire with ſteel.

It is very difficultly cut, and flies from the tools in irregular chips.

It makes no effervefcence with Aqua Fortis.

It burns to a deep chocolate colour.

Examin'd attentively by the Microſcope, it is a very agreeable object; it is ſeen compos'd of a roundiſh, and purely cryſtalline Gritt, the Granulæ no where coming into contact with one another, but all cover'd with a thin ſkin of the ferrugineous cement, and lodg'd at ſome diſtance in a maſs of the ſame matter; among theſe are a vaſt number of ſpangles of a white foliaceous Talc, which give a pleaſing variety to the whole.

This is a Stone in which there is abſolutely no Spar either incorporated in the Granules of the Gritt, or in the interſticial matter; the cementitious ſubſtance, which in this is the greater part of the maſs, is an argillaceous earth, highly ſaturated with particles of iron, and by them render'd itſelf of a ſtony hardneſs; the Gritt is plainly compos'd of ſmall Pebble Cryſtal, and ſo firmly united by the cement as to make a moſt hard Stone.

I have obſerv'd it in Suſſex, Glouceſterſhire, and many other counties, but no where more plentifully than about Briſtol: it generally lies in immenſe ſtrata; I have ſeen of them twenty foot thick, divided in different places by horizontal cracks, and multitudes of perpendicular fiſſures, the ſides of which laſt are commonly lin'd with red or yellow ochres, and many of them fill'd up with them; it is alſo often found in nodules, and disjointed pieces.

It is very ſtrong, bears the weather well, and is us'd in ſome places in building; were not the richer ores of iron common in the kingdom, this might be work'd as one.

6. *Pſadurium friabile, ferrugineum.*
Soft, friable, ferrugineous Pſadurium.

This is a very coarſe and harſh Stone, of a looſe, open, ſpungy texture, and very porous; it is conſiderably heavy, and of a duſky, diſagreeable, browniſh, ferrugineous colour, ſpangled with a few flakes of a foliaceous Talc; it is compos'd of a large roundiſh Gritt, ſurrounded with, and cemented together by a looſe ferrugineous earth; it is of no great hardneſs in the maſs, and when reduc'd to ſmall pieces, eaſily crumbles between the fingers into a looſe powder; water pour'd on it readily pervades its ſtructure, and wets it thro'.

It will not eaſily ſtrike fire with ſteel, and crumbles to pieces in cutting.

It makes no effervefcence with Aqua Fortis.

It burns to a deep browniſh red.

Examin'd by the Microſcope, it appears a looſe, open, ſpungy maſs, compos'd of a roundiſh Gritt, evidently ſmall, and pure Pebble Cryſtal, enclos'd in thin cruſts of a looſe ferrugineous earth, and cemented by a great quantity of the ſame matter thrown between them, for the Granulæ of the Gritt ſcarce any where come into contact even with their cruſts.

It is common in moſt counties of England, is ſoft and eaſily cut while in the earth, and ſeldom divided by many fiſſures; it evidently contains no Spar, its cementitious matter being a mere marly earth, render'd hard and tenacious by particles of iron.

It is no where, that I know of, put to any uſe, nor ſeems fit for any.

SERIES I.

CLASS II. ORDER I. GENUS II.

AMMOSCHISTA.

SECT. I. Compos'd of only ſparry and cryſtalline Particles.

1. *Ammoſchiſtum friabile, grizeum, hebes.*
Grey, friable, dull Ammoſchiſtum.

THIS is a coarſe, harſh, and rough Stone, of a very looſe texture, and appearing ſomething porous; it is conſiderably heavy, of a duſky greyiſh colour, and perfectly deſtitute of brightneſs; it is compos'd of a large, coarſe, obtuſely angular Gritt, ſurrounded, and in part held together by a looſe, earthy Spar; it is very ſoft and friable in the maſs, but much more ſo when reduc'd to ſmall pieces, theſe being, in ſome ſort, to be crumbled between the fingers; water pour'd on it ſlowly pervades its ſtructure.

It will not eaſily ſtrike fire with ſteel.

It ſplits eaſily into thin horizontal flakes, and theſe are plainly ſeen to be compos'd of a multitude of thin Lamina laid cloſely on, and in ſome degree adhering to one another.

It makes a violent effervეſcence with Aqua Fortis.

It burns to a pale whitiſh red.

Examin'd by the Microſcope, it appears compos'd of a large, obtuſely angular, impure, cryſtalline Gritt, of a moderate tranſparence, laid pretty cloſely together, and evidently cohering wherever it comes in contact one Granule with another; theſe are ſurrounded by, and their interſticial ſpaces every where fill'd with a looſe terrene Spar, part of it whitiſh, in ſome ſmall degree tranſparent, and ſerving as a cement, tho' but a ſlight one to the Granulæ, and part opake and blackiſh, and lodg'd in the cavities, and among the Granulæ in detach'd pieces; it is plain that the formation of the ſtrata of this ſtone was, by a great number of ſediments of cryſtalline and ſparry matter, intermix'd before they were perfectly harden'd, and even ſetling upon one another before the ſingle Lamina were each of them perfectly harden'd, had they ſubſided on one another while perfectly moiſt, the whole had made one indiſcriminate maſs, had they been each perfectly harden'd before the ſucceeding cruſt fell, they could not have coher'd in nearly the degree they do; the coheſions where one yet ſoft cryſtalline or ſparry body has fallen upon another, when perfectly indurated, being always very ſlight: Thus, from the ſtructure of Foſſils themſelves, the manner of their formation may be often determin'd by comparing it with that of others.

This is very common in Leiceſterſhire, Northamptonſhire, Yorkſhire, and many other counties; I have generally ſeen it in thick ſtrata, and lying near the ſurface; it is ſubject to great horizontal cracks, dividing it from the other ſtrata, and to very frequent gullies or perpendicular fiſſures: theſe are generally full of earth, and ſometimes cover'd with incruſtations of ſparry matter on the ſides, and divide the ſtrata into ſtacks of eight, ten, or more feet broad, from which the ſtone is eaſily rais'd in thick flakes, which ſeparate very readily when they have lain ſome time in the weather; it ſeldom holds ſhells.

It bears the weather but badly, and is very apt to crumble after froſts, yet is very frequently us'd to cover houſes inſtead of tile; 'tis, however, much inferior to the harder kind, hereafter to be deſcrib'd, us'd in Northamptonſhire on the ſame occaſions: its Granulæ evidently hold Spar, for they are but dully and duſkily pellucid, and are broken, and in part diſſolv'd by Aqua Fortis.

SECT. II. Compos'd of talcy, ſparry and cryſtalline Particles.

1. *Ammoſchiſtum ſcintillans, albido-fuſcum.*
Browniſh-white, glittering Ammoſchiſtum.

This is a Stone of a moderately ſmooth and even texture, conſiderably firm, compact and heavy, and naturally of a pale whitiſh brown, but often alter'd in its colour from extraneous matter entering and being lodg'd in its interſtices by the water that pervades the ſtrata; many of the Stones of this Claſs are in ſome degree ſubject to theſe variations, but this more than I think any other; the occaſion is, that the particles capable of ſtaining whole beds of Stone, are continually ſuſpended in the water that falls on them, ſuch of theſe bodies as are of a looſe open texture admit the water with all theſe particles in it, and ſuffer it freely to paſs out with them again; ſuch as are of a very firm and cloſe texture, drain the water off into them, and ſuffer none of theſe extraneous particles to enter with it, while thoſe of a middle texture may have their pores ſo ſeized and ſituated, as to admit water thus ſated to enter them, but perform the office of a filter to it, and ſuffering it to paſs off alone, detain theſe particles behind; and by frequent repetition of this proceſs, become at length differently ting'd by them: this is unqueſtionably the caſe in regard to this Stone, which in the different parts of the ſame ſtratum, and while its texture, conſtitution and appearance in all places, is exactly the ſame, colour only excepted, ſhall be in one part of this pale brown, its true natural colour, in another of a deep duſky hue, in others greyiſh, whitiſh, or yellowiſh, and in ſome ferrugineous; the people in the Northern parts of the kingdom, however, where it is common, are very ſenſible of this, and know all theſe varieties by the common name, white Flag; it is the moſt bright and glittering of all the Stones of this kind, and ſhews the broadeſt ſpangles of any other kind on its flat ſurfaces; but when broken tranſverſely like all other of the micaceous ſlaty Stones, it ſcarce ſhews any appearance of them; it is of a very regular and evenly laminated texture, and lies in flat plates from one third of an inch to four or five inches thick, the thinneſt always uppermoſt, and all the flakes growing thicker and thicker to the bottom; it ſplits evenly and readily at the commiſſures of theſe, but is conſiderably hard, and not eaſily broken in any other direction; water poured on it, ſlowly enters its ſtructure.

It will not eaſily give fire with ſteel.

It ferments very briſkly with Aqua Fortis, but is not more than one third of it diſſolv'd by it.

It burns to a fair greyiſh white.

Examin'd by the Microſcope, it appears form'd of a congeries of obtuſely angular particles, ſurrounded with and held together by a whitiſh, browniſh, or greyiſh earthy Spar, and interſpers'd with large flakes of a very bright foliaceous Talc, all laid in a regular horizontal direction, and principally in continued Series, as if filling up ſome interſtice or commiſſure of two plates, too narrow to be viſible to the naked eye; hence it is, that they make ſcarce any figure when this Stone and others of this kind are broken tranſverſely, becauſe we then ſee only their edges; but if the maſs ſplit flatwiſe, and that at one of theſe natural commiſſures we are preſented with a whole Series of them, all ſhewing their flat ſurfaces.

It is very common in the Northern counties, and uſed on many occaſions, the upper or thinner flags for covering houſes inſtead of tiles, and the thicker for paving and building.

2. *Ammoſchiſtum ſcintillans, e grizeo aliquantulum vireſcens.*
Greeniſh-grey, ſhining Ammoſchiſtum.

This is a very elegant and beautiful Stone; it is coarſe, harſh, rough and of a ſomewhat ſpungy texture; conſiderably heavy, of a greyiſh white with a faint caſt of green, and full of bright, glittering ſpangles; it is compos'd of a large, oblong, angular Gritt, very pellucid, and of a conſiderable brightneſs; the Granulæ of this are crowded very cloſe together, and evidently cohere firmly wherever they come in contact; among theſe are diſpers'd a vaſt number of fine, ſmall and very bright flakes, of a glittering, white, foliaceous Talc; theſe and the Granulæ are bound into a maſs with a very ſmall quantity of a cementitious matter which is itſelf very pure, and tranſparent in ſome degree, and does not ſurround the Granulæ as is common in other

Stones, but only fills up in ſome meaſure the interſticial cavities between them; it is moderately hard and firm in the maſs, and readily ſplits in an horizontal direction, but not into very thin flakes; water poured on it, pretty readily pervades its ſtructure.

It does not eaſily ſtrike fire with ſteel.

It makes a ſlight effervеſcence with Aqua Fortis.

It burns to a pale browniſh red.

Examin'd by the Microſcope, it appears compos'd of a fine, angular, cryſtalline Gritt, many of the Granulæ are truely and regularly hexangular, and not diſtinguiſhable from ſmall ſhoots of ſprig Cryſtal; theſe cohere in many places, and have their interſticial ſpaces fill'd up, tho' not perfectly, with a ſemi-pellucid, cryſtalline Spar, and ſome ſmall quantity of a more terrene one in form of powder among it, and interſpers'd with fine Micæ of a bright Talc; the Gritt of this being pure Cryſtal, is not broken, or at all affected by Aqua Fortis, and by frequent affuſion of that Menſtruum, I have made it take up all the Spar, break the particles of the cement, and leave a pure maſs of Cryſtals conjoin'd in different places, and interſpers'd with looſe Micæ; the abſolute coheſion of the Granulæ is plain from this, and that the concrete does not wholly owe its hardneſs to the cement.

I found a large ſtratum of it near Mendip-Hills; it lay at ſome depth, had frequent horizontal cavities in its own maſs, which is not common, and many perpendicular fiſures, but theſe laſt commonly ſmall and empty; its ſeveral Lamina cohere firmly together; whence it may be infer'd, that they ſubſided quickly upon one another, and coaleſced while both were ſoft; for this reaſon it is not eaſily ſplit into thin flakes, but parts readily only where there happened a more perfect hardneſs of one Lamina before another was added.

It is us'd for covering houſes, but is very heavy and inconvenient.

3. *Ammoſchiſtum laminatum, ſcintillans, e grizeo, aliquantulum flaveſcens.*
Yellowiſh grey, glittering Ammoſchiſtum.

This carries a great external reſemblance of the former; it is a very rough, coarſe and harſh Stone, of a firm but ſomewhat porous texture, conſiderably heavy, and of a yellowiſh grey, ſpangled very beautifully all over with a fine white Talc in ſmall flakes; it is of a more obſcurely laminated ſtructure than moſt of the ſlaty Stones, and ſplits more difficultly and uncertainly than any other; it is compos'd of a large obtuſely angular Gritt, compos'd of a mixture of Cryſtal and Spar, and but moderately pellucid; this is laid pretty cloſely together, and coheres very firmly where it comes in contact; its interſticial ſpaces are fill'd up partly with a cryſtalline, and partly with a terrene Spar, and the whole is thickly ſpangled with very fine and thin flakes of Talc: It is very hard in the maſs, and is not to be crumbled when in ever ſo ſmall pieces.

It will not eaſily ſtrike fire with ſteel.

Water poured on it, very ſlowly enters its ſtructure.

It raiſes a very violent effervеſcence with Aqua Fortis.

It burns to a fine pale red.

Examin'd by the Microſcope, it appears a ſpungy duſty maſs, very firmly cohering in all its parts, and ſo cloſely join'd at the commiſſures of the ſeveral Lamina, that it ſeems to have been very nearly moiſt enough after the whole ſubſidence, to have form'd a plain congeries, or undivided ſtratum.

It is dug in many parts of France, and uſed in the coarſer ſorts of work about publick buildings.

4. *Ammoſchiſtum duriſſimum, albo-purpureum.*
Hard, purple and white laminated Ammoſchiſtum.

This is greatly the hardeſt and moſt elegant Stone of this Claſs; it is very rough and harſh, of a firm, compact and cloſe texture, extreamly heavy, and in colour finely variegated with a greyiſh white and purple, the Laminæ being much thicker than thoſe of any of the former, and part of them often entirely of the one, and part entirely of the other of theſe colours; it is extreamly bright and glittering, its whole ſubſtance being very pure and ſhining in itſelf, and ſpangled beſide with a multitude of ſmall flakes of a fine foliaceous Talc; it is vein'd acroſs in ſome places by ſhining white lines, and is more obſcurely and irregularly laminated than any of the former, but is plainly compos'd of plates from one eighth to one third of an inch broad, and will not readily break in any other direction, tho' it eaſily enough ſplits according to the commiſſures of theſe tables: It is compos'd of a fine, glittering, but very irregularly ſhaped Gritt, and a cementitious matter almoſt equally pure and ſhining, neither of them much inferior to the Talc in brightneſs. It is of extream hardneſs: water poured on it, ſinks not at all into its ſurface.

It readily ſtrikes fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It burns to a ſomething paler colour.

Examin'd by the Microſcope, it appears a bright, glittering maſs, compos'd of cryſtalline particles, almoſt loſing their ſhape, and as it were melting into, and uniting with the cementitious matter which is of the ſame texture and conſtitution with themſelves; they are oblong and obtuſely angular, and ſeem compos'd of a cryſtalline matter, debas'd in ſome degree from its native purity by a mixture of earthy particles; the white tranſverſe lines in it are ſtreaks of an almoſt entirely pure cryſtal, which have fill'd up ſome narrow cricks or dry joints, as our quarrymen call them, in the ſtratum; they are a ſmaller kind of fiſſures, not of the horizontal kind, but interſecting the ſtacks of Stone in different angles; ſometimes almoſt perpendicular.

It is plain from a view of the ſtructure of this Stone, that the cementitious matter and that of the Granulæ, were nearly of the ſame degree of hardneſs when they fell together, and had almoſt made one uniform maſs together, and made the concrete a Stone of the ſucceeding Claſs.

It is common in Italy, where it is much uſed in pavements.

5. *Ammoſchiſtum micaceum, ſubcæruleum.*
Blueiſh, glittering ſlate Stone.

This is a moderately fine and ſmooth Stone, of a cloſe, compact texture, extreamly heavy, and of a deep duſky lead colour, glittering all over with multitudes of fine talcy particles; theſe are ſcarce viſible where the Stone is broke acroſs, but where there is a plain flat ſurface made by ſplitting, they appear more numerous than even the Granulæ; it is of a more regularly laminated texture than moſt others of this Claſs, the tables lying perfectly even on one another, and being in general of about one tenth of an inch thick; it is a general obſervation, that in all theſe as well as the other ſtrata of Stone, the upper ſtrata are the narroweſt, and the lower the thickeſt as they lie in the earth; this is extreamly natural from their manner of formation, which was by gradual ſubſidence from a fluid, where they are irregularly plated as in the former Stone; it ſhould ſeem to prove, that the fluid out of which they ſubſided, had been diſturbed, where evenly like this, it ſeems plain that all was calm above; what gives greater conformation of this, is alſo, that the plates of this Stone cohere ſo firmly together, as not to be eaſily ſeparated, which is owing to the one having ſubſided on the other before they were become hard; and it is eaſy to conceive that a heavier maſs in a calm fluid, muſt ſubſide much quicker than a lighter in a diſturb'd one, and this coheſion of the ſeveral tables muſt be a neceſſary effect of this.

It is compos'd of a ſmall and irregularly ſhap'd Gritt, often loſing its figure, and almoſt entirely blending itſelf with the matter of the cement; which is of the ſame kind with itſelf, a cryſtalline ſubſtance, obſcur'd and debas'd by an admixture of earthy particles; it is of extream hardneſs.

It readily ſtrikes fire with ſteel.

It does not at all admit water into its texture.

It raiſes a ſlight effervefcence with Aqua Fortis.

It burns to a reddiſh brown, loſing all its original colour in the fire.

Examin'd by the Microſcope, it appears compos'd of an irregular cryſtalline Gritt, almoſt blended with a cryſtalline cement, and interſpers'd with a multitude of flales of Talc, and a great quantity of a cryſtalline Spar in form of powder, or in very ſmall Granulæ; this it is alone that ferments with the Aqua Fortis; for ever ſo frequent affuſions of that Menſtruum hurt not at all the texture of the Stone, but the piece taken out afterwards is found more pure; the Talc, the Granulæ and the cementitious matter all untouch'd, but the ſparry matter alone taken up by the acid.

It is a common Stone in Italy, and is us'd in building.

SERIES I.

CLASS II. ORDER II. GENUS I.

SYMPEXIA.

Finer Stones, of a more cloſe, compact and firm texture, and of a plain uniform ſtructure, ſpliting with equal eaſe in any direction.

In the deſcriptions of the Stones of the preceding Claſs, I have had frequent occaſion, in order to give ſome rational account of their original coaleſcence, to have recourſe to beds of half concreted ſparry matter for the Stony Granules to ſubſide into; ſince there was evidently no coheſion of the Granulæ themſelves, nor any other way any account to be given for the coaleſcence and firmneſs of the maſs.

It might naturally be aſk'd on the frequent recourſe had to this matter, whether there muſt not have been immenſe beds of it into which no part of theſe Granulæ came in the way of ſubſiding, ſince there were ſo many where it did; as we purſue a knowledge into the works of the Great Creator, we ever find one thing explain another, and the Claſs we are now entering on will furniſh us with frequent inſtances of theſe ſimple maſſes in the different degrees of purity, and ſhew us what was the conſequence of maſſes of this kind, being left to coaleſce alone.

SECT. I. White or whitiſh ROCK STONE.

1. *Sympexium albidum, denſius, hebes.*
Denſe, dull-looking, whitiſh Sympexium.

THIS is a moderately fine, but very irregularly conſtructed Stone, compos'd of a ſofter, whitiſh, earthy Spar, interſected in all directions, but principally horizontally by thin flat plates of a cryſtalline one; the earthy part of this is moderately denſe, compact and hard, the cryſtalline much more ſo, and the whole forms a maſs tolerably hard and heavy; it contains no Granulæ of any kind. Water pour'd on it, very ſlowly and imperfectly pervades its ſofter parts.

It makes a violent effervescence with Aqua Fortis, and is almoſt entirely diſſolv'd and taken up by it.

It burns to a blueiſh white with ſome admixture of redneſs.

Examin'd by the Microſcope, the coarſer part of this Stone appears a pure homogene maſs, of a white and perfectly opake terrene Spar; the plates that every where interſect this are of a very fair and compact cryſtalline Spar, of a dull whitiſh colour, and ſemi-pellucid. I have had occaſion before to obſerve, that the cementitious matter of many of the Stones, before deſcrib'd, is a mixture of a terrene and cryſtalline Spar; into a bed of this matter the newly concreted Granules, which form the Gritt of many of thoſe Stones, accidentally ſubſided, and form'd thoſe concretes: but this Stone has evidently been a bed of the ſame matter, into which none of theſe Granulæ having ſubſided, it was left to coaleſce and harden by itſelf; theſe Granules, which in a great meaſure keep theſe maſſes together, particularly in thoſe where themſelves cohere independently of the cement, being wanting in theſe new form'd ſtrata, it is no wonder, that on the receding of the aqueous matter as they dry'd, the hard particles coming cloſer and cloſer together in their different combinations, form'd cracks and clefts between each; theſe were probably at firſt empty, but water in after times continually pervading the ſtrata of this, as it does of all other Stone while in the earth depoſited in theſe cracks, as it does in thoſe of all other Stone, either thoſe ſparry particles it came impregnated with, or perhaps others, which it waſh'd out of the matter of the ſame ſtratum, and in time abſolutely fill'd them up, and left us the variegated Stone we find; the narrow fiſſures of all Stone of ſtrata are found generally thus fill'd up, and the only reaſon of theſe plates being ſo frequent in this, ſeems that the maſs was, from its natural ſtructure, more apt to crack in drying than thoſe where the additional coheſion of the Gritt prevented; and this is countenanc'd by another obſervation, which I have ſeldom known to fail, which is, that thoſe Stones of viſible Gritt, in which the Granulæ cohere, have always fewer cracks, or plates of Spar, than thoſe in which they are only held together by the cement.

This is a common Stone in England, Germany, and many other places; much of it is brought to London from different places, and us'd in building; it is generally cut in a perpendicular direction to the ſtrata, and ſhews the edges only of the plates of Spar, which as they lie, in general, nearly horizontally, and are flexuous and uneven, are not unfrequently taken for the edges of large ſhells: I have a hearth in my own houſe, made of ſuch a ſection of one of theſe Stones, which has led many to imagine ſo; it ſeldom however really contains ſhells; the ſpecimen I keep of it is from the ſhores of the Mediterranean, and has lain in the reach of the ſea till finely ſcoop'd and perforated by Pholades; there are ſome of the ſhells yet remaining in the holes, and they have not bor'd it in horizontal directions, or in the ſofter parts of the Stone only, but have gone thro' it all ways, and cut the plates in a thouſand places.

The ſofter part of this Stone ferments violently with Aqua Fortis, and both that and the plates are diſſolv'd, and almoſt entirely taken up by it.

2. *Sympexium durius, albido-grizeum, hebes.*
Hard, greyiſh-white, dull Sympexium.

This is a moderately fine Stone, of a denſe, compact texture, and tolerably ſmooth ſurface; it is conſiderably heavy, and of a dull-greyiſh, and ſometimes browniſh-white, and theſe are two varieties, which might poſſibly paſs on an inaccurate obſerver for diſtinct ſpecies; it is a pure, compact, homogene maſs, compos'd of no viſible Gritt, eaſily cut, not ſo ſoon blunting the tools employ'd about it as many others, and like all of this claſs, flying off from them in chips, not mouldering away in powder; water pour'd on it ſcarce at all pervades its texture.

It will not eaſily ſtrike fire with ſteel.

It ferments violently, and is almoſt wholly diſſolv'd by Aqua Fortis.

It burns to a fine and pure white.

Examin'd by the Microſcope, it appears a regular homogene maſs, compos'd of no viſibly diſtinct particles, but very pure, and in thin pieces, a little approaching to tranſparency.

It is common in Leiceſterſhire, Yorkſhire, Northamptonſhire, and other counties; while in the earth it is much ſofter than when taken up, and in Yorkſhire, where it frequently hangs out from the ſides of hills in rugged ſtrata, this outer part is much harder than that within; it ſeldom holds ſhells, is generally of a tolerably even ſurface, and eaſily parts in an horizontal direction, which is owing to this, that it is viſibly compos'd of a number of ſtrata laid cloſely on one another, and cohering but ſlightly together; theſe are of different thickneſſes, from two or three foot to half or a third part of an inch, and always grow gradually thinner and thinner up to the top; it is ſubject to very frequent gullies, as the diggers call them, that is, to large and wide perpendicular fiſſures; I have ſeen of them often four feet broad, and fill'd up with earthy matter; it is by theſe divided into ſtacks in the earth, from which parting pretty readily at the commiſſures of the ſtrata, it is eaſily rais'd by the workmen.

Its origin and manner of formation may be eaſily determin'd from theſe obſervations; it conſiſts wholly of one of thoſe beds of matter, which would have made the cementitious ſubſtance of one of the harder Arenaria, had any of the Granules of that claſs of Stones fallen among it; and is a terrene Spar, with ſome admixture of a cryſtalline one blended with it, and has evidently ſubſided at different times, but thoſe very quickly ſucceeding one another, and out of a calm and undiſturb'd fluid, the lower ſtrata of it are hence the thicker, and of the harder and heavier matter, the upper thinner, and more looſe and light, and all not laid looſely on, but penetrating in ſome degree into, and firmly cohering with one another, from their falling on each other before thoroughly harden'd.

It is us'd in buildings, and bears the weather tolerably well; it is eaſily ſmooth'd, but will take no great poliſh; houſes are built of it in ſome parts of Northamptonſhire, and many other places; it is burnt alſo into a coarſe and poor lime.

3. *Sympexium durius, poroſum.*
Hard, porous Sympexium.

This, tho' no beautiful, is a very ſingular and remarkable ſtone; it is of a coarſe, ſpungy, porous texture, yet very hard and heavy, in colour naturally and generally of a greyiſh-white, but this it is ſubject very frequently to vary in, and might eaſily lead a young obſerver into the error of multiplying ſpecies from it; it is ſometimes browniſh, ſometimes yellowiſh, and ſometimes black; but theſe are ſo far from making diſtinct ſpecies, that I have them all in one piece of not half a pound weight; and the reaſon of this ſtone's being ſo ſubject to theſe varieties of colour is very plain, ſince from its porous texture it readily admits matter of different kinds and colours into its body, and thence acquires the ſeveral tinges; it is not abſolutely dull, or deſtitute of brightneſs, but in ſome parts, particularly where the pores are ſmaller or leſs numerous, looks a little gloſſy; it is compos'd of no Gritt, but evidently wants particles of that kind to fill up its vacuities, and with ſuch would have made a very firm and valuable Stone; it is very hard, not eaſily cut, and apt to ſpoil the workmens tools: water pour'd on it readily gets into its pores.

It freely ſtrikes fire with ſteel.

It makes no efferveſcence with Aqua Fortis, unleſs in ſuch places where its pores are fill'd with adventitious alkaline matter.

It burns to a pale reddiſh white.

Examin'd by the Microſcope, it appears a very agreeable object, reſembling an open ſpunge of an impure cryſtalline matter, ſemi-tranſparent, of a ſomething whitiſh caſt, and much reſembling the matter of the common paler flints; this ſubſtance is wav'd in a thouſand ſinuoſities, and makes cavities of all ſhapes and dimenſions, which tho' naturally empty, are frequently found fill'd with adventitious, earthy, ſparry, bituminous or metalline matter; and according to the nature of theſe adventitious particles it ferments more or leſs with Acids, and burns to different colours.

It is evidently compos'd of cryſtalline matter, debas'd by an admixture of a white dead earth, of the tobacco-pipe clay, or white-bole kind, and being of too compact and firmly united a texture, to part into cracks in drying after its original concretion, its particles receding with more difficulty from one another, ſeem to have ſeparated but a little way, and left theſe ſmall cavities only between; I have ſeen ſpecimens of this Stone, in which theſe cavities having been ſince fill'd with cryſtalline matter of the ſame kind and colour, have left the Stone hardly to be known; but theſe are uncommon, the pores of the maſs being generally ſo large and frequent, as to leave the water that paſſes the ſtrata free room to run off, without leaving its ſtony particles behind it; it is a very common Stone in Yorkſhire, and is found in ſome other parts of England; the ſtrata of it generally lie deep, are interſected by few perpendicular fiſſures, and ſeldom contain ſhells; it is us'd in building in Yorkſhire, and ſome other places, but is a rough, ill-looking Stone, and very difficult to cut.

4. *Sympexium duriſſimum, ſplendidum grizeum.*
Hard, bright-grey Sympexium.

As the preceding Stone was abſolutely of cryſtalline matter, tho' debas'd by various mixtures, this, tho' appearing much brighter, and more like cryſtal to the naked eye, we ſhall find, on examination, to be abſolutely ſparry; and the obſervation of theſe two ſpecies alone may ſhew how uſeful, and even neceſſary, are the accurate enquiries into the nature of theſe bodies, and how little their external appearance is to be depended on.

This is a very elegant and beautiful Stone, of a fine texture, very hard, and conſiderably bright and ſhining; it is very heavy, and of a blueiſh or greyiſh white; it is a pure, homogene maſs, compos'd of a plated, cryſtalline Spar, and in ſome ſpecimens is variegated with ſmall pieces of the ſame matter, but black, and lodg'd in it like the Granulæ of the Gritt of ſome of the Arenaria, only at greater diſtances; the Stone is frequently without theſe, and where they are, they are ſo ſmall as not to be diſcernable but on a cloſe inſpection.

Water pour'd on it enters ſcarce at all its texture. It is but difficultly made to ſtrike fire with ſteel.

It ferments violently in Aqua Fortis, and is almoſt totally diſſolv'd, and taken up by it.

It burns to a pale blueiſh red.

Examin'd by the Microſcope, it appears a confus'd maſs, of a fair cryſtalline plated Spar, equally pellucid in all parts, and compos'd of much the ſame matter with many of the ordinary purer Spars; in thoſe ſpecimens which have the black ſpots they are ſeen to be ſmall pieces of the ſame matter, their angles ſometimes perfectly ſharp, in others blunted, and moſt of them ſomewhat flattiſh; theſe are thrown into the maſs in all directions, and firmly cohere with it in all parts.

This Stone is plainly compos'd of a congeries of that matter which forms the Granulæ of the Gritt of ſome of the ſparry Arenaria, coaleſcing and running together into a confus'd heap, without ever concreting into theſe Granules, and thence not wanting, and by its firm coaleſcence excluding all cementitious matter, tho' in its conſtituent particles it contain much of the ſubſtance that might have form'd it.

It is no common Stone, I remember it only in Yorkſhire, where I ſaw alſo only one ſtratum of it; this was divided by large, empty, perpendicular fiſſures, into ſeveral ſtacks, of ten, twelve, and more feet wide, and every where conſiſted of three ſeparate ſediments, tho' made ſo quickly after one another, that the commiſſures of them were no where diſtinct or viſible, the lower part of the ſtratum was debas'd with an admixture of a whitiſh earthy matter, the middle, which was much the largeſt of the three, was ſpeckled with the black grains already deſcrib'd, and looking like the Gritt of ſome of the Arenaria, and the top was perfectly pure.

They dug it both for building, and burning into lime, for both which purpoſes it is an excellent Stone.

5. *Sympexium duriſſimum, ſplendidum, albido fuſcum.*
Hard, bright, browniſh-white Sympexium.

This is a very firm, compact, and hard Stone, of a cloſe texture, very heavy, of a pale, browniſh white, and moderately bright and ſhining; it is naturally a pure homogene maſs, compos'd of a cryſtalline Spar, and is in thin pieces, in ſome degree pellucid; water pour'd on it does not at all enter into its ſtructure.

It will not ſtrike fire with ſteel.

It ferments very briſkly with Aqua Fortis, and is almoſt wholly diſſolv'd and taken up by it.

It burns to a pale whitiſh red.

Examin'd by the Microſcope, it is a very agreeable object, its whole maſs appears a tolerably bright and tranſparent whitiſh Spar; it is almoſt always diverſify'd alſo with a variety of ſmall ſhells of the Tellina and Pectunculus kind; and in many places where the ſhell is periſh'd and gone, the ſpace it once fill'd is now fill'd up with a congeries of ſmall, but very beautiful and regular trigonal ſhoots of a very fine and tranſparent cryſtalline Spar; the ſhells themſelves, in many places, are alſo remaining, and afford a pleaſing variety.

It is brought from Purbeck for uſe in building, in pavements, &c. in London, but is alſo found in many parts of the kingdom; in Northamptonſhire I remember to have ſeen a ſingle ſtratum of it between two of free Stone at a conſiderable depth; in Yorkſhire I have alſo ſeen large ſtrata of it, and have every where obſerv'd it leſs ſubject to perpendicular fiſſures than many other Stones; in Yorkſhire there were not above two in the whole ſtratum that I ſaw; and in Northamptonſhire many of thoſe that divided the upper ſtrata of free ſtone did not affect this at all, and ſuch as did, became very narrow in it.

It is us'd in Northamptonſhire in building, and in the making tomb-ſtones, and in London is common in our pavements; it does not cut eaſily, but approaches to marble in the poliſh it takes.

6. *Sympexium duriſſimum, hebes, albido flaveſcens.*
Dull, yellowiſh-white, hard Sympexium.

This is a moderately fine, but very irregularly conſtructed Stone; but is, in general, of a cloſe, compact, firm texture, of an irregular ſurface, very heavy, and of a pale dead white, with pale yellow veins and ſpots in ſeveral places, and a faint caſt of the ſame colour thro' the whole maſs; it has little or no brightneſs, tho' compos'd almoſt wholly of a very fair cryſtalline Spar, leſs debas'd with an admixture of an earthy one, than moſt of theſe Stones, tho' more ſo than the laſt deſcrib'd. It is very hard: water pour'd on it pervades not at all its ſtructure.

It does not readily ſtrike fire with ſteel.

It ferments violently with Aqua Fortis, and is almoſt entirely diſſolv'd and taken up in it.

In the fire it burns to a fair white.

Examin'd by the Microſcope, it appears a mixture of a cryſtalline and an earthy Spar, but with much the greater proportion of the firſt; of this its general maſs conſiſts; the earthy kind has a little debas'd its tranſparency in the whole, but in many places is alſo lodg'd in veins and ſpots perfectly opake, and of a looſer texture; in many other parts of the Stone there are plates of a yet purer and harder Spar, which have fill'd up irregular cracks made by the receding of the parts of the Stone from one another in drying; and in other places theſe cracks yet remain, in ſome meaſure, empty, and are planted all over with trigonal ſhoots of a pale yellowiſh Spar.

This ſeems compos'd of the very ſubſtances that might have made the Granulæ and cementitious matter of one of the Arenariæ, had the harder matter concreted firſt, but all coaleſcing together they have form'd this mix'd maſs.

It is common in Dorſetſhire, and ſome other counties; the ſtrata generally lie deep, and are full of perpendicular fiſſures, the ſides of which are generally incruſted with Spar; it ſometimes contains ſhells principally of the Tellina kind, but often appears to do ſo when it does not, from the edges of the irregular plates of a harder Spar before deſcrib'd, filling up the accidental cracks which have been very frequent in the maſs.

It is a very uſeful Stone in building; it bears the weather well, and is of a very remarkable hardneſs, but is difficult to cut.

7. *Sympexium durius, hebes, albo fuſcum.*
Dull, hard, browniſh-white Sympexium.

This is generally ſo full of ſhells as to be more than half made up of teſtaceous matter; it is a very coarſe and harſh Stone, conſiderably heavy, of a dull pale browniſh white, and wholly deſtitute of brightneſs; it is conſiderably hard, and does not at all admit water into its ſtructure.

It will not readily ſtrike fire with ſteel.

It ferments violently with Aqua Fortis, but leaves almoſt half its ſubſtance undiſſolv'd by it.

It burns to a greyiſh white.

Examin'd by the Microſcope, it makes a very pretty appearance; its conſtituent matter is a coarſe cryſtalline Spar, of a pale dead white, and but ſlightly tranſparent; the ſhells are lodg'd in this, not at random, and in all directions, as in ſome Stones, where there are fewer of them, but all ſeem of one ſpecies of the Tellina kind, all of the ſame ſize very nearly, and all laid in orderly even ſtrata; they lie flat in the Stone, and make a bed of about half an inch thick generally, over which is one of like breadth of the ſtony matter, with very few ſhells in it, and over that another of ſhells again; the ſhells are all cloſely pack'd together, and often cruſh'd; in many places the teſtaceous matter is periſh'd and gone, and a deep-blueiſh ſparry matter has fill'd the cavities where the ſhells once were, and retains exactly their ſhape. In ſome quarries it is altogether thus.

There is no doubt, but that the fluid out of which this Stone was form'd by mere ſubſidence, was of a conſiſtence to bear the ſhells ſuſpended in it while in motion; and that this maſs was form'd by the ſubſiding of quantities of theſe, and of ſtony matter almoſt at the ſame inſtant of time; for in the cloſeſt aſſemblages of ſhells, there is ſtony matter among them, and no part of the purer ſtony maſs is wholly free from ſhells, or the remains of them.

This is brought in great quantities from Purbeck, and us'd in the flat pavements in London.

8. *Sympexium marmoreum, albido-ſubcinereum.*
Whitiſh grey, marbly Sympexium.

This is a very beautiful and very uſeful Stone; it is of a conſiderably fine, and very firm, even and compact texture, remarkably heavy, of a whitiſh colour, with a faint admixture of a blueiſh grey, which is ſometimes ſo ſlight as ſcarce to alter it from a pure tho' dead white; and has a remarkable tho' not ſtrong ſmell, which is faintiſh, and in ſome degree reſembles that of the Florentine Iris Root where freſh broken; it is alſo ſomewhat of a ſparkling appearance, and is not unfrequently ornamented with Dendritæ and other black marks from accidental flaws and cracks; it never contains ſhells, ſo far as is yet known; it is conſiderably hard, and capable of a tolerable poliſh; water pour'd on it does not at all pervade its ſtructure, but oil continually rubb'd over it by degrees changes its colour to a deep brown.

It gives fire very freely with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a pure white.

Examin'd by the Microſcope, it appears of a very cloſe and even texture, conſiderably bright, and full of ſhining particles, and in thin pieces is a little tranſparent; and ſeems compos'd of cryſtalline matter, highly ſated with a foul whitiſh earth.

It is not found in England, but is extreamly common in large ſtrata in all the Eaſtern nations, and even in Italy, and ſome parts of Germany.

It is in great uſe with our artificers for ſetting a fine edge on their tools, and is commonly known among them, by the name of the Turkey Stone; it is not unfrequently brought to us in thin flat pieces lying on the ſtratum which has been next beneath it in the earth, and this being uſually a black one, has a very pretty appearance.

9. *Sympexium ſiliceum, albido-flaveſcens.*
Yellowiſh white, flinty Sympexium.

This and the two following, approach to the texture of the common Flints in appearance, and the next deſcribed has really much of their nature.

This is a very fine, ſmooth and gloſſy Stone, of an extreamly firm, cloſe and compact texture, very heavy, and of a ſomewhat browniſh or yellowiſh white; it never that I have yet obſerved contains ſhells: it is extreamly hard. Water poured on it, enters not at all its texture; but notwithſtanding its flinty appearance, it yields fire but difficultly with ſteel.

It makes a very great and very laſting efferveſcence with Aqua Fortis.

It burns to a greyiſh or blueiſh white.

Examin'd by the Microſcope, it looſes its flinty appearance, and is ſeen to be a plain ſemi-pellucid, yellowiſh white cryſtalline Spar, a quantity of which concreting alone, and without all heterogene admixtures in the once univerſal fluid, ſeems to have form'd this Stone.

It is common in Northamptonſhire, Leiceſterſhire, and many other parts of England, where among other ſtrata of a coarſer kind, it is known by the name of Ragſtone and Limeſtone; it never conſtitutes ſtrata of any great thickneſs, but generally lies deep among the Arenaria; it is generally very free from fiſſures, but where there are any, their ſides are always encruſted with a cryſtalline Spar.

It is us'd in the pavements of ſtreets, but is too rough and rugged, and too hard to cut to come into uſe in building; in many places they burn it into lime.

10. *Sympexium ſiliceum, albido-ſubfuſcum:* *Browniſh-white, flinty Sympexium.*

This is the Stone in ſome parts of England called Chert or Whern.

It is greatly the fineſt in texture of all the Stones of ſtrata, and has evidently very much of the nature of the common Flints; it is of a cloſe, compact, firm ſtructure, conſiderably heavy, of a pale browniſh white, and is ſometimes vein'd and ſpotted with red, white and black, and breaks with an even, gloſſy ſurface, like the common finer flinty Pebbles; it is very hard, and water cannot in the leaſt enter its pores.

It gives fire readily with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

In the fire it cracks and flies off in thin flakes, but afterwards calcines to a pale blueiſh grey.

Examin'd by the Microſcope, it appears very much of the ſtructure of the ordinary Flints, but ſomewhat coarſer or more loaded with earth, and more opake; the black ſpots are more opake than the reſt, as are alſo the reddiſh veins; but the white lines are a very pure Cryſtal, and are evidently no other than original cracks fill'd up with that matter; there is no doubt but that this owes its origin to a quantity of truly flinty matter, debas'd by an admixture of earth, and by it determin'd not to coaleſce in detach'd pieces as it would elſe have done, but to remain together and ſubſide in ſtrata.

It is often found among other ſtrata of Stone, but like the former, never makes any very thick ones itſelf; Dr. Woodward mentions one of three foot thick in Yorkſhire, but I have not been able to find any of more than a third part of that thickneſs there; I don't mean to infer from this, that there are are not ſuch, for I have heard of them in ſome other plaees; I only mean, that they are not common.

Sect. II. The Blueiſh.

1. *Sympexium ſiliceum, ſubcæruleum.* *Blueiſh, flinty Sympexium.*

This has but little leſs of the appearance of a Flint than the former, but differs from it greatly in its ſtructure and conſtitution; it is a fine, ſmooth Stone, of a cloſe, compact, even texture, conſiderably heavy, and of a deep duſky greyiſh blue; it is conſiderably hard, and breaks with a tolerably ſmooth and gloſſy ſurface; and has ſome ſtraight blueiſh white veins, looking like fine China ware in different places. Water cannot at all pervade its pores.

It gives fire but difficultly with ſteel.

It makes a ſtrong and laſting effervefcence with Aqua Fortis, and burns to a pale grey.

Examin'd by the Microſcope, it loſes at once both its flinty look and dark colour, and appears no other than a ſemipellucid cryſtalline Spar of a pale dead whitiſh hue; it is plainly not of the origin or nature of the former, but like the ſpecies deſcrib'd before, has ow'd its origin to a quantity of this ſemi-pellucid cryſtalline Spar coaleſcing alone, and without all heterogene mixtures in the ſame fluid, from whence all theſe things have ſubſided.

It is found in moſt counties of England where there is Stone, and generally lies at conſiderable depths among other Stone, and in very thin ſtrata; it is ſeldom found much cracked, but in many places ſhews the blueiſh white lines before deſcrib'd, exactly reſembling the fine earthen ware of China; which are places that have plainly been once cracks, but are ſince filled up with this, which is a finer matter than the reſt, and raiſes a ſlighter fermentation with the Aqua Fortis.

The Stone generally lying immediately over this is the *Sympexium durius poroſum*, before deſcribed, and theſe have uſually fallen ſo quickly upon one another that they every where cohere firmly, and are not to be regularly ſeparated by any art; and it is not uncommon to find the lower part of the ſtrata of this ſo debas'd with earthy matter as to be render'd perfectly opake, and much more friable; this is one of the many varieties among theſe Foſſils which might miſlead almoſt any body into the opinion of a new ſpecies, but the obſervation of theſe two always lying in the ſame ſtratum, and the gradual alterations every where obvious from the fineſt of this Stone to this coarſeneſs, where there is any of it, muſt ſet any one right who ſees it in the ſtrata.

It is burnt into lime in many places, and makes ſo good a kind, that the workers of it would be very glad if it was more plentiful.

2. *Sympexium duriſſimum, ſubcæruleum.*
Hard, blueiſh Sympexium.

This is a very rough and hard Stone, and generally extreamly full of ſhells, or Spar caſt in the cavities left by them; it is of a firm, compact texture, extreamly heavy, of a deep blueiſh grey, and in ſome places a little ſhining; water poured on it, enters not at all its ſurface.

It will not readily give fire with ſteel.

It ferments violently with Aqua Fortis, and is in a great meaſure diſſolved by it.

It burns to a pale whitiſh grey.

Examin'd by the Microſcope, it appears a ſomewhat coarſe, greyiſh, cryſtalline Spar, every where fill'd with ſhells, or Spar, filling the cavity where they once lay, and frequently ſpangled with fine pellucid pieces, of a pure Spar, which lying with their flat ſurfaces upward, much reſemble plates of a foliaceous Talc: the ſhells in this are lodg'd in all directions, and nearly equally in all parts of the Stone, not in regular beds covered by others of a clearer Stone, as in the *Sympexium durius, hebes, albo-fuſcum,* before deſcribed; and therefore this has not been originally form'd like that of different ſubſidings of ſhelly and ſtony matter one on another, but plainly from a mixed maſs of both, ſinking and coaleſcing together.

It is brought to us in great quantity from Purbeck, and is in common uſe in our flat pavements; it is not much us'd in buildings, being hard to cut, tho' it is capable of a poliſh little inferior to that of many kinds of Marble.

3. *Sympexium durius, fuſco-cæruleum, hebes.*
Browniſh blue, dull, hard Sympexium.

This is a coarſe, rough and conſiderably hard Stone; it is of an irregular ſtructure, conſiderably heavy, and of a deep, duſky, browniſh blue, ſeldom pure, but in moſt places variegated with lines and ſpots of a pale red, and an opake white; it is perfectly dull, unleſs here and there in a few places where there have been cracks or other vacuities in tract of time fill'd up with a purer Spar, and it does not at all admit water into its texture.

It will not ſtrike fire with ſteel.

It makes a ſtrong and laſting effervescence with Aqua Fortis, and is in a great meaſure diſſolv'd by it.

It burns to a pale blueiſh white.

Examin'd by the Microſcope, it appears a mixt maſs, its principal matter being a coarſe, blueiſh, black, opake, earthy Spar; this is motled with larger and ſmaller variegations, of an opake, whitiſh and reddiſh matter, of the ſame figure and texture, and differing only in colour; theſe variegations are diſpos'd in ſpots or lines, and very plainly ſhew the Stone to have been form'd by the ſlow coaleſcence of the earthy Spar, which makes the body of the maſs into which theſe red and white parcels of the ſame kind of matter fell, when it was too ſoft to deny them entrance, tho' too far hardened to ſuffer them to blend and mix themſelves with it.

It is found in many parts of England, but no where ſo plentifully as in Leiceſterſhire, where it is known by the name of blue Lime-ſtone; it generally lies embedded in other ſtrata of Stone, and uſually forms ſtrata of a conſiderable thickneſs itſelf; in Yorkſhire, I have ſeen great plenty of it, the perpendicular fiſſures of the ſtrata of free Stone that are over it, pervade this generally alſo; and it is obſervable, that if they are naked in the other ſtrata, they are generally encruſted with ſparry matter in this.

It makes a good lime, and is valuable in building, but not much us'd for that becauſe of the difficulty of bringing it into ſhape.

Sect. III. The Reddiſh.

1. *Sympexium hebes, pallide rubens.*
Dull, pale red Sympexium.

This is a moderately fine and ſmooth Stone, of a firm compact texture, conſiderably heavy, and of an agreeable pale red, generally very pure, but ſometimes ſpotted and blotch'd with ſmall parcels of the matter of the laſt deſcrib'd, which generally makes the ſtratum either above or below it, and is ever in ſuch caſes firmly connected to it; water has no effect on it, nor at all enters its ſtructure.

It will not eaſily be made to ſtrike fire with ſteel.

It ferments violently with Aqua Fortis.

It burns to a very pale whitiſh or greyiſh red.

Examin'd by the Microſcope it appears compos'd of an earthy Spar, of a fine cloſe texture, but perfectly opake, vein'd in ſome places, with ſlender white lines, which are cracks fill'd up with a cryſtalline Spar, and ſpotted in a few places, by an intermixture of a blueiſh matter, which ſeems to have fallen into the bed of it before thoroughly concreted.

It is common in Leiceſterſhire and ſome other counties, and is us'd in building walls, and other coarſe work (for they will not be at the pains of hewing it for the finer) and is in ſome places burnt into a very good kind of lime.

2. *Sympexium rubrum, ſplendidum, duriſſimum.*
Hard, ſhining, red Sympexium.

This is a very elegant and beautiful Stone, of a fine cloſe compact texture, very heavy, and of an agreeable red, ſpangled in many places with ſmall pieces of a very gloſſy Spar, appearing not unlike flakes of a foliaceous Talc; it is extreamly hard, and capable of a very good poliſh. Water cannot at all pervade its ſurface.

It will not readily ſtrike fire with ſteel.

It ferments violently with Aqua Fortis, and is in a great meaſure diſſolv'd and taken up by it; and burns to pale red.

Examin'd by the Microſcope, it appears a fine pure homogene maſs, pellucid in thin pieces, and of a fair pale red; its conſtituent matter is plainly a cryſtalline Spar, debas'd by a large admixture of a pale red earth, and the brighter ſpecks are ſeen to be fragments of a very bright and pure pellucid Spar; it appears very plainly to have ow'd its origin to the concretion of this debas'd Spar alone, and the ſpecks of a more lucid one, are ſmall fragments that concreted alone like the Gritt of the Arenaria, and fell into the maſs while ſoft enough to receive them.

This is a ſtone ſuppos'd not to be found in England, and imported in conſiderable quantities from Sweden, Norway, Denmark and ſome other places, for our uſe in pavements, in which it is much valu'd. I have ſeen of it in Yorkſhire ſuperior to any I ever met with from abroad; it lay deep, and conſtituted but a thin ſtratum, divided into ſtacks of three or four feet thick, by many ſmall and empty perpendicular fiſſures; it ſeem'd evidently form'd of many ſediments from a ſtill fluid, the ſtratum being compos'd of ſeveral beds, from three inches to an inch thick, the thinner at the top, as is always the caſe, and theſe ſeeming eaſily ſeperable from one another. Ours in England contains no ſhells, the Norwegian is famous for holding a fine ſtrait concamerated ſhell, known to ſome late German authors, by the Name of Orthoceratites.

It is little inferior to marble for pavements.

3. *Sympexium rubro-vireſcens, variegatum.*
Green and red variegated Sympexium.

This is a very ſingular and very beautiful Stone; it is of a rude irregular ſtructure, and conſiderably coarſe for a ſtone of this Claſs, but is evidently compos'd of no viſible Gritt, or ſeperately concreted Granules; it is of a ſomewhat lax texture, but not at all porous, moderately heavy, of very little ſplendor, but of a very agreeable variegation of colour; the maſs of a duſky and more opake pale browniſh red, and interſpers'd very plentifully with blotches, and ſhort uneven lines, of a more pellucid and much finer pale green Spar, and not a few fragments of a white and ſemi-pellucid one. It will be ſeen on an accurate obſervation, that all theſe green ſpecks form ſhort wav'd or irregular lines, and all in the ſame direction, which is perpendicular to the ſite of the ſtratum. The white ones ſeem indiſcriminately blended among the matter of the maſs.

This is but of a ſlight degree of hardneſs; water pour'd on it, however, does not at all enter its texture.

It will not readily ſtrike fire with ſteel.

It ferments violently with Aqua Fortis, and is in a great meaſure diſſolv'd by it.

It burns to a pale yellowiſh white, without the leaſt remainder of either red or green in it.

Examin'd by the Microſcope, it appears a maſs of a pale browniſh red earthy Spar, of a rough ſurface, and perfectly opake; variegated thro' its whole ſubſtance with large blotches of a white and equally opake matter of the ſame kind, and moſt beautiful variegations in perpendicular wav'd lines, of a fine pellucid cryſtalline Spar, of a very beautiful pale green: The origin of this Stone has evidently been, that a bed of the earthy Spar, differently ſated with its reddiſh earth, and in ſome places left without it (whence the white ſpots) ſubſided at once in the univerſal fluid; and that while it was hardening, a quantity of this elegant green Spar ſubſided on it, which as it found the maſs below too firm to admit it all at once, cou'd make its way into it only as it has done in ſmall parcels, ſinking imperfectly and perpendicularly thro' it.

It is found in Derbyſhire in ſinking to their lead mines, but is made no uſe of.

SECT. IV. The Black.

1. *Sympexium durius, nigrum, hebes.*
Hard, black, dull Sympexium.

This is a very fine and elegant Stone, of a firm cloſe texture, ſmooth ſurface, and very great hardneſs; it is conſiderably heavy, in moſt parts entirely deſtitute of ſplendor, but if very nearly view'd, is found to have ſome ſhining ſpecks in a few places. It approaches greatly in its texture to black marble; water pour'd on it is not able at all to penetrate it.

It will not readily ſtrike fire with ſteel.

It ferments violently with Aqua Fortis, but is not half diſſolv'd by it.

It burns to a fine blueiſh white.

Examin'd by the Microſcope, it appears a pure homogene maſs, perfectly opake, of a fine cloſe texture, and compos'd of a firm earthy Spar, ſated with the ſame particles that give blackneſs to marble; here and there appear a few lucid ſpecks, which are not of Talc, but a very gloſſy Spar.

It is frequently thrown up in digging on Mendip Hills, but is there made no uſe of: In Leiceſterſhire there are many ſtrata of it, and it is there burnt into lime; it makes a very good kind, and with very little firing in compariſon of many others.

2. *Sympexium duriſſimum, ſplendidum, nigrum.*
Hard, black, ſhining Sympexium.

This is an extreamly hard, and very glittering Stone; it is of a ſomewhat coarſe, but very firm and compact texture, remarkably heavy, and of a fine very deep black, but very bright, and full of glittering particles; it approaches very much to the texture of ſome of the harder marbles, and ſeems capable of an excellent poliſh; water pour'd on it has no effect.

It makes no effervеſcence with Aqua Fortis, unleſs, as it ſometimes has, it have ſpecks of a white Spar amongſt it; then theſe ferment, and might lead an inaccurate obſerver to imagine the body of the ſtone did ſo.

It burns to a pale browniſh red.

Examin'd by the Microſcope, it apears a congeries of cryſtalline matter, in oblong angular pieces in many parts, tho' in others run into a confus'd maſs, and the purer parts of it are ſomewhat pellucid, and of a fair green, the reſt ſo ſated with particles of a black earth, as to be much debas'd and render'd perfectly opake. It is plain, that this ſtone has owed its origin to a maſs of cryſtalline matter in that univerſal confuſion of things in the fluid, from which all theſe have ſubſided, debas'd by ſo large a mixture of earthy matter, as to be unable to ſhoot into cryſtalline columns, and therefore ſinking together; ſuch parts of this matter as were leſs ſated than the reſt with theſe heterogene particles, aſſembling in different parts of the ſtone, have plainly emulated the columnar figure, and give us the true colour the whole had before this earthy admixture, which was a fair green.

It is found in Derbyſhire in ſinking after lead; the workmen call it black Stone, but know no uſe of it.

3. *Sympexium mollius, hebes, nigreſcens.*
Soft, dull, black Sympexium.

This is a very valuable, tho' not a very beautiful Stone; it is of an even, but not very firm or compact texture, and of a tolerably ſmooth ſurface, but no great hardneſs; it is very heavy, and is of a dull duſky hue, without the leaſt appearance of brightneſs, and unleſs nearly view'd, appearing more like the broken ſurface of an Earth than of a Stone. It approaches in texture to the common black ſlate, but is not fiſſile; water pour'd on it does not at all penetrate its ſubſtance.

It will not give fire with ſteel.

It does not at all ferment with Aqua Fortis.

It burns to a pale grey; and it is of ſo little hardneſs, that it is eaſily ſcrap'd with a knife.

Examin'd by the Microſcope, it appears of a ſomewhat rugged and rough texture, and ſhews in ſome parts ſome ſmall ſhining ſparkles, but theſe very few and ſmall.

It is dug in moſt of our northern counties, and is us'd very frequently as a whetſtone to ſet an edge on carpenters tools, &c.

SERIES I.

CLASS II. ORDER II. GENUS II.

STEGANIA.

Stones of a compact texture, and laminated ſtructure, ſplitting into fine plates.

SECT. I. White or Whitiſh STEGANIA.

1. *Steganium albidum, fragile.*
Brittle, white Steganium.

THIS is a ſoft friable ſlaty Stone, of a tolerably fine and cloſe texture, not at all porous, conſiderably heavy, perfectly dull, and deſtitute of brightneſs, and of a dead whitiſh colour, variegated ſometimes with a pale brown, and ſometimes with a browniſh yellow. It is compos'd of a number of plates, generally of about one ſixth of an inch thick, laid very firmly, tho' not very evenly on one another, and pretty readily ſplits at the commiſſures of them, eſpecially after lying ſome time in the air; water pour'd on it ſlowly and but imperfectly pervades its texture.

It will not eaſily ſtrike fire with ſteel.

It ferments very ſtrongly with Aqua Fortis, but is not above one third of it abſolutely diſſoluble in it.

It burns to a greyiſh white, with a mixture of redneſs.

Examin'd by the Microſcope, it appears a perfectly homogene maſs, of a pure white, unleſs ſtain'd by theſe adventitious browniſh or yellowiſh earthy particles, and in thin pieces is a little pellucid. It has plainly ow'd its origin to the repeated ſettlings of a calm fluid, made ſo quick upon one another, as to cohere, and in ſome places run together into each others ſubſtance.

It is very common in many counties of England, but no where more ſo than in Northamptonſhire, where it uſually lies near the ſurface; and is generally full of perpendicular as well as horizontal cavities, but many others which there have been, are found fill'd up with a Spar, a little purer, and more cryſtalline than the reſt, and making the appearance of irregular veins.

Its lying ſo near the ſurface, and in ſuch great plenty, makes it very cheap, and of common uſe in Northamptonſhire and other places, for covering houſes.

SECT. II. Red STEGANIA.

1. *Steganium purpureum, ſplendidum.* *Purple Steganium.*

This is a very fine and elegant Slate, of a ſmooth ſurface, and firm, compact, and cloſe texture; it is conſiderably heavy, and of a very beautiful pale purple, glittering all over with ſmall gloſſy ſpangles; theſe are very bright, and tho' too minute to be ſeen diſtinctly, unleſs on a near view, yet where they are not diſtinguiſh'd from the reſt, give a great luſtre to the whole. It is compos'd of a multitude of very thin plates or flakes, laid cloſely and evenly on one another, and cohering pretty firmly; water does not at all pervade its ſtructure.

It is too ſoft to ſtrike fire readily with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a duſky brown.

Examin'd by the Microſcope, it appears a pure homogene maſs, of a ſmooth, even texture, perfectly opake, but ſpangled with a number of ſmall lucid points, which from their rhomboidal ſhape, and plated texture, appear evidently to be ſmall Selenitæ; the whole is compos'd of an almoſt infinite number of fine thin flakes, laid cloſely on one another, and ſeems compos'd of cryſtalline matter, debas'd in hardneſs, and render'd perfectly opake by an admixture of a vaſt quantity of a red earth.

Let it not appear ſtrange, that I attribute ſo fine a matter as Cryſtal, as the baſis of theſe opake Stones; chymical Analyſes prove that they conſiſt of no other particles than this and earth, and nature herſelf ſhews their containing Cryſtal by the ſides of their perpendicular fiſſures being continually cover'd with ſprigs of it in all its purity, which have every one of them been ſeperated by water out of the Stones they now adhere to, may always be ſhewn by chymiſtry to be in them; and wherever they are in any plenty in theſe fiſſures, always leave the adjoining Stone the poorer, and more ſoft and crumbly.

This Slate has evidently ow'd its origin to a quantity of Cryſtal, ſo far debas'd with earth, as to be unable to ſhoot in columns, and has been form'd by different, and very quick ſucceeding ſediments from a calm fluid.

It is very common in the Northern parts of England: in Cumberland, Northumberland, and the adjoining counties there are immenſe ſtrata of it.

It is much valu'd as a ſtrong and beautiful covering for houſes.

SECT. III. Blue STEGANIA.

1. *Steganium ſubcæruleum.* *Common blue Steganium.*

This is a very well known, and very uſeful and valuable Stone; it is of a fine ſmooth texture, and gloſſy ſurface, moderately heavy, and of a pale greyiſh blue, compos'd of a multitude of even plates, laid cloſe upon one another, and eaſily ſplitting at the commiſſures of them; water does not pervade its ſtructure.

It is too ſoft to ſtrike fire with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It burns to a duſky brown, but is apt to crack and fly in pieces in the fire.

Examin'd by the Microſcope, it appears a pure homogene maſs, compos'd of a cryſtalline matter, debas'd with an admixture of a blue clay, but that in much ſmaller proportion than in the former; for this, even to the naked eye, if view'd a-ſlant or ſide-ways, and turn'd about ſo as to catch the light in various directions, has much of a cryſtalline caſt; and view'd with the Microſcope in thin pieces, is tolerably pellucid. The whole maſs of this Slate is compos'd of a multitude of thin plates, laid cloſely on one another, and evidently form'd by ſubſidence of heavy matter, at very quickly repeated intervals from a fluid at reſt, or nearly ſo.

It is very common in the Northern parts of England, and is us'd in moſt places for the covering of houſes, for it is ſoft enough to cut eaſily into form, and ſplits readily at the commiſſures of the plates into any thickneſſes.

In the quarry it is very ſubject to perpendicular fiſſures, which ſometimes divide it into ſtacks of no more than three or four foot wide; but this is no diſadvantage, as it is never wanted in larger pieces than theſe, and is eaſier rais'd than if in larger beds. The ſides of the larger Gullies are often incruſted with a coarſe cryſtalline matter, and the narrower cracks are often fill'd up with the ſame matter, and made ſo many white veins interſecting the maſs in different directions.

2. *Steganium friabile, fuſco ſubcæruleum.*
Browniſh blue, friable Steganium, commonly call'd coal Slate.

This is a ſubſtance found almoſt every where over coal, and famous for the vegetables, particularly that vaſt variety of the Fern kind it contains, moſt of which it is alſo to be obſerv'd are not of our own country, but plainly of American growth.

It is a coarſe, but ſmooth friable Stone, of a compact texture, very heavy, and of a duſky blueiſh brown in moſt places, tho' in ſome of a fair blue, and in others nearly approaching to black. It is of an irregularly and obſcurely laminated ſtructure, and generally full of vegetable matter between its plates; water ſcarce at all pervades its ſtructure.

It is too ſoft to ſtrike fire readily with ſteel.

It makes no effervescence with Aqua Fortis.

It burns to a pale red.

Examin'd by the Microſcope, it appears a confus'd maſs, of a dull opake earthy matter, full of ſpangles, of an impure Cryſtal, and of ſmall plated fragments or parts of Selenitæ. It ſeems to owe its origin to a ſtiff clayey matter, not unlike the ordinary tile Clay, juſt held together, and made into a ſort of Stone, by a ſmall quantity of Cryſtal, which is more than half of it probably unmix'd alſo, and makes a part of the ſhining ſpecks before mention'd.

There are ſtrata of it almoſt every where over coal, and it is ever thrown up in great quantities in digging for it, but is of no uſe that I have ever heard.

3. *Steganium friabile, cinereo-nigricans.*
Greyiſh-black, friable Steganium, commonly call'd Shiver.

This is the moſt looſe, friable and ſhattery of all the Stones of this Claſs, and has thence obtain'd its name among the common people of the counties in which it abounds.

It is a moderately ſmooth and fine maſs, but of a very looſe and open texture, of conſiderable weight, and in colour of a mixture of grey and black; and perfectly dull and deſtitute of ſplendor; it is of a very regularly laminated ſtructure, and the commiſſures of its ſeveral plates are often wide; they ſeldom indeed cohere, and where there is no viſible interſtice between them, an accurate view will generally ſee them ſeparated by a greyiſh, or whitiſh matter; it is in general very ſoft and friable, tho' ſome parts of it much leſs ſo than others: water pour'd on it ſoon pervades its ſtructure.

It will not readily give fire with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It burns to a faint red.

Examin'd by the Microſcope, it ſeems a looſe, opake, and in general, earthy maſs with ſome ſmall admixture of an impure cryſtalline cement, which here and there diſcovers itſelf in ſpecks to the Microſcope, tho' not viſible to the naked eye; the greyiſh matter filling the interſtices of the plates, in many places is ſeen to be a ſemi-pellucid maſs, much reſembling an impure Salt, and by the taſte is diſcovered to be Allum; this liquating in the air, leaves the ſpaces it originally fill'd all empty, and is the principal reaſon of the falling to pieces of the maſs when expos'd to the weather, as it ever very ſoon does. According to the quantity of this Salt in the compoſition, it is alſo obſerv'd that ſome pieces of it are harder, and continue longer in the air, without falling to pieces than others.

It is common in all the Northern counties of England, the lower parts of the ſtrata of it are ſometimes very firm and thick, and us'd on various occaſions there under the name of plate; the upper are looſe, thin and ſhattery, and ſoon crumble in the weather; theſe they call Shiver, and uſe as a Marle in agriculture.

All that I have ſeen of it has contain'd a conſiderable quantity of Allum, and I am ready to believe, there are many places where it would anſwer very well to work it for that Salt.

4. *Steganium griſeo cæruleum, ſcintillans.* *Greyiſh blue, ſparkling Steganium.*

This is a very uſeful, and withal a very beautiful ſubſtance. It is of a ſomewhat uneven, but very compact texture, and of an irregularly laminated ſtructure; it is compos'd of a number of plates, which are diviſible into very thin and fair ones, and theſe are laid very cloſely on one another; but the large congeries of them are often bent, undulated and inflected, and toward the upper part of the ſtratum are very often found mutilated or deficient in part; theſe are compos'd of very regularly arrang'd, oblong and flat fibres, which are all of a very bright and glittering hue when the maſs is freſh broken, and have much of a talcy appearance, ſo that the whole is very remarkably bright and gloſſy. It is conſiderably heavy, and of a pale-greyiſh blue, and is moderately hard, but ſplits very readily and eaſily in an horizontal direction, and may with a little care be ſeperated into regular plates, of a twelfth of an inch in thickneſs; water pour'd on it is not able to pervade its ſtructure.

It does not give fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a yellowiſh ſpangled maſs.

Examin'd by the Microſcope, it appears compos'd of a very beautiful arrangement of long flaky fibres; and in the ſmall interſtices between the ſeveral plates, there is ſometimes diſcovered a whitiſh matter more dull and opake than the reſt.

It is found in large ſtrata in many of our Northern counties, and ſometimes in conſiderably large detach'd maſſes on the ſhores of the ſea; it is in common uſe among our artificers, as a whetſtone, to give a good edge to their tools, after the wheting them on one of the coarſer Stones.

SECT. IV. The Black STEGANIA.

1. *Steganium nigrum, friabile, aluminoſum. Quod Lapis Hibernicus authorum.* *Friable, aluminous, black Steganium. The Iriſh Slate of the ſhops.*

This is the Lapis Hibernicus, Merr. Pin. 213. Lapis Fiſſilis Hibernicus, Charlt. Foſſ. 16. Tegula Hibernica Dale's Pharm. 281. Ardeſia, Hibernica, Tegula Hibernica Ind. Med. 62.

It is the ſofteſt and moſt friable of all this Claſs; it is a coarſe rough Slate, of a lax crumbly texture, conſiderably heavy, and of an impure, or ſomewhat browniſh black; it is compos'd of a multitude of thin flakes, laid very evenly and regularly on one another, and ſplits very readily at the commiſſures of them; water pour'd on it, very readily gets between the plates, and in ſome degrees pervades their texture.

It is too ſoft to ſtrike fire readily with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It burns to a ſtrong bright red.

Examin'd by the Microſcope, it appears a coarſe irregular maſs, often ſpeckled with ſmall whitiſh particles, but this principally after lying ſome time in the air; it ſeems plainly compos'd of a blackiſh earthy matter, with barely ſo much cryſtalline admixture as will hold it together in the form of a looſe Stone, of which indeed it hardly deſerves the name; it has evidently, like the reſt, been form'd by different quick repeated ſediments, from a calm fluid.

It is common in many parts of Ireland, and is alſo found in Somerſetſhire and ſome other parts of England; it always lies near the ſurface, and in very thick ſtrata, which are divided generally by many perpendicular and horizontal fiſſures, the latter of which are commonly empty, the former fill'd up with earth or gravel from the upper ſtrata.

It is us'd in medicine in Hæmorrhages of all kinds with ſucceſs, and is talk'd of as a good medicine in fevers; that it ſhou'd prove an Aſtringent is no wonder, for by a chymical Analyſis, I have procur'd one 9th part of its weight of pure Allum from ſome of the beſt pieces of it; the queſtion is, whether the preſcribing ſo much of the pure Salt might not better anſwer the intention of the giver alone, than with the load of a vaſt doſe of the dead and uſeleſs earth it is emboided in.

It is owing to theſe aluminous particles, that this ſtone at times ſhews lucid ſpecks, appearing like Cryſtal or Spar before the Microſcope: they are really no other than pure Cryſtals of Alum.

SERIES I.

CLASS II. ORDER III. GENUS I.

MARMORA, MARBLES.

BRight and beautiful Stones, compos'd of ſmall ſeparate concretions, moderately hard, not giving fire with ſteel, fermenting with, and ſoluble in acid Menſtrua, and calcining in a ſlight fire.

Nature has made the Genera of this order diſtinct in regard to the teſts of Acids, Fire, and Steel, but has by no means done ſo in regard to the other two orders of Stones, many of each being compos'd of blended particles of Cryſtal and Spar, and by that means rendering theſe diſtinctions and characters impoſſible to be aſcertain'd to whole Genera, tho' conſtant and invariable in the ſeveral ſpecies; Spar is the baſis of Marble and Alabaſter, Cryſtal of Porphyry and Granite, which are therefore diſtinct Genera.

The Marbles are a claſs of bodies generally ſuppos'd well known, becauſe ſeen every day, and much in uſe, but they are in reality, notwithſtanding that, perhaps one of the moſt confus'd, and leaſt underſtood Claſſes of the whole Foſſil kingdom; the people who work them know nothing more of them than that this will, and that will not receive a poliſh in a high degree; and that this may be work'd, and another refuſes the tools; and the men of ſcience have conſider'd them even leſs than theſe.

The Marbles were one of thoſe ſets of bodies of this part of the creation, with which the Antients were well acquainted, and it may give no ſmall light into their true hiſtory, to pay a ſtrict attention to all they have left us concerning them, and endeavour, as far as their works will bear us out, to aſcertain which we have, and which we now have not, of the many they us'd; and to ſettle which of the kinds now in uſe was that call'd by one or another name in their writings; this may ſerve to give us a certain account of what they knew, and perhaps point out to the builder, ſtatuary, and phyſician, ſome new uſes, at leaſt new to us, of many of them.

Critical enquiries of this kind are by many too ſlightly regarded; few indeed have the abilities and application neceſſary to make them; but when made they certainly are of at leaſt equal importance with the works of the Antients themſelves, ſince it is moſt plain that their writings can be of no uſe without them: What does it ſignify to us, that Theophraſtus or Dioſcorides have related ſuch or ſuch virtues or uſes of ſuch a Stone, or Earth, unleſs we can aſſuredly know what that Stone or Earth is, and where to be had? In many *things, to our great misfortune, this knowledge is not now to be arriv'd at, partly from the ſhortneſs of the accounts given of the ſubſtances in the books in which they are treated of, partly from the errors in the copies of thoſe books, and partly from the loſs of others, which have never come down to us; but where it can be had, ſurely it muſt be allow'd inferior to none in value.*

The colours of Marbles being a very obvious and ſtriking character, as well as a very determinate one in theſe bodies, it may not be improper to arrange them into diviſions according to them.

SERIES I.

CLASS II. ORDER III. GENUS I.

MARMORA.

DIVISION I. *Marbles of one plain colour.*

SECT. I. The White plain MARBLES.

1. *Marmor album, ſplendidiſſimum, denſius: Quod Marmor Parium antiquorum.*

Firm, compact, white and bright Marble, the Parian Marble of the antients, and the ſtatuary Marble of the moderns.

THIS is a Marble which has been ever in high eſteem, and more frequently celebrated in the writings of the antients than any other kind, from its uſe in ſtatues; we keep up the uſe of it ſtill to the ſame purpoſe, and know it now under the name of ſtatuary marble.

It is the Marmor Parium, Plin. v. 2. p. 274. Marmor Lychnites nonnullorum ib. Marmor Parium, Salm. in Solin. 129. Aldrov. Muſ. Met. 748. Cæſalpin. de Metall. 89. and many more Synonyma might be added, but that the inaccuracy of too many authors has led them to call all white marbles Parian, as our people call all the ſame kinds Alabaſter; and almoſt all the world have confounded this with the Carrara Marble, to be next deſcrib'd; but their difference is very evident, if examin'd together, that valuable Marble being of a finer ſtructure, and whiter than the Parian, but leſs bright and ſplendid, and harder to cut, and not capable of ſo glittering a poliſh.

This is an extreamly bright and elegant Marble, of a firm, compact, and cloſe texture, conſiderably heavy, and of a very elegant white, but generally with ſome admixture of a faint blueiſh caſt, and frequently vein'd with blue ſtreaks of different breadth; it is extreamly bright and glittering, and capable of the brighteſt poliſh of all the Marble claſs; and this, and its not being very difficultly cut, has made it the favourite kind among our modern, as well as among the antient ſtatuaries. It is compos'd of a congeries of moderately large particles of flat ſurfaces, but much ſmaller, of a more regular ſize and figure, and much more firmly united than thoſe of the alabaſter kind, and compos'd of a harder Spar; it is moderately hard in the maſs, and not eaſily crumbled to pieces in ſmall fragments: water ſcarce at all pervades its pores.

It will not ſtrike fire with ſteel.

It ferments violently with Aqua Fortis, and is capable of being wholly diſſolv'd by it.

In the fire it calcines to a ſnow white.

Examin'd by the Microſcope, it appears a very beautiful object; it is compos'd of a multitude of ſimilar particles, all of the ſame degree of luſtre and tranſparence, and very nearly all of the ſame ſize and figure; notwithſtanding that they appear flat to the naked eye, they are here diſcover'd to be all naturally pretty regular parallelopiped figures; there are variations indeed in ſome places, but theſe are owing wholly to the haſty concretion of the maſs, and accidental jumbling of two or three concretions together,

gether, or an imperfection of figure in ſome others from the ſame cauſe, as we continually ſee in the cryſtallization of Salts, to which the concretion of theſe hard bodies, in their original fluid, is a perfectly analagous operation, tho' employ'd about abſolutely different matter: of this I ſhall have occaſion to diſcourſe more at large hereafter, but on this occaſion would obſerve, that as in the cryſtallization of Salts the too haſty evaporation of the fluid, and other cauſes, may occaſion a number of complex, irregular, and mutilated figures, and perhaps afford but a few cryſtals, pure, and in their true form among the whole maſs, ſo in theſe like concretions of ſtony matter in its original fluid, tho' every part in this inſtance ought to have been a regular parallellopiped, yet, from a multitude of cauſes, many of them perhaps to us unknown, a great number of theſe concretions became irregular, complex, and mutilated as we find them; none in this Marble have, however, any other flatneſs than what is on the plain ſide of a concretion, or of two, or ſometimes three, accidently join'd together; the conſtituent particles of this Marble, and of ſome others, not unaptly reſemble the Gritt or Granulæ of the coarſer Arenaria, but they are ever more cloſely conſtipated together, cohere every where where they come into contact, which is in almoſt their whole ſurfaces, and have no interſtitial matter between them.

The iſland of Paros, one of the Cyclades in the Ægean ſea, and call'd ſometime Pactya, and Minoa, was ever famous for this marble.

Antiquity is divided, whether to give the origin of the name of this marble to the iſland of Paros, whence it was brought, or to the famous Sculptor Agoracritus Parius, who firſt ennobled it by a ſtatue of a Venus cut in it; Varro imagines it to have been call'd Lychnites, from its being cut by the light of lamps, from λυχνὶς, a lamp, candle, or other ſuch light, and tho' he is generally follow'd in this etymology, I cannot but diſſent from him, imagining, as the brightneſs and ſplendor of this marble was ever its diſtinguiſhing character, and is ſo ſtill, that it is a much more natural derivation to ſuppoſe it, from the verb λυχνευειν, to be very bright, or ſhine.

It has ever been eſteem'd the firſt and fineſt of all marbles for the ſtatuaries uſe.

2. *Marmor albiſſimum durius : Marmor Lunenſe Antiquorum. Hard, white Marble; the Marmor Lunenſe of the Antients, and Carrara Marble of the Moderns.*

This is a Marble which has ever been well known in the world, and ever in the ſame eſteem that it is at preſent, a very good one in building, and alſo in the ſtatuaries buſineſs, but tho' whiter than the Parian, always leſs valu'd, becauſe more hard to cut, and capable of a leſs glittering poliſh.

It is the Marmor Lunenſe, Plin. 725. Marmor Liguſtrium Aldrov. Muſ. Met. 748. Marmor Lunenſe quod hodie Carrarienſe Cæſalpin. 89.

It is a very fair and beautiful Marble, of a much firmer, and more cloſe and compact texture than the former, very heavy, of a very pure and perfect white, much more tranſparent than any of the other white marbles, and conſiderably bright, tho' greatly leſs ſo than the former; it is conſiderably hard, and leſs eaſily cut than the Parian, and when cut, tho' capable of a perfectly ſmooth ſurface, is never of ſo bright a poliſh as it; it is compos'd of a congeries of ſmall glittering particles, ſeemingly cruſh'd and crouded cloſe together into a confus'd maſs, many of them appearing to be of flat ſurfaces, and all compos'd of a very hard, and perfectly white Spar; it is very hard in the maſs, and not to be crumbled when in ever ſo ſmall pieces; water does not at all pervade its ſtructure.

It will not ſtrike fire with ſteel.

It ferments very violently with Aqua Fortis.

It burns to a pure white.

Examin'd by the Microſcope, it appears at once the moſt confus'd and moſt beautiful maſs imaginable, compos'd of an infinite multitude of ſmall cubic, or ſomething like cubic particles, crouded together into a cloſe union, and every where entrenching upon and ſpoiling one anothers form; I have before obſerv'd, that this Marble in the maſs is much more tranſparent than any of the other white ones, and it keeps the ſame excellence in its examination before the Microſcope, all its particles being much more pellucid and leſs white than thoſe of the others, and the reaſon of its different qualities from the Parian, are evident from this examination; if I obſerv'd the concretion of the particles in the former to be crowded, complex, irregular and variouſly mutilated in the former Marble, in this they are much more ſo, very few being of any thing like a perfect parallellopiped form, tho' all evidently tending to it.

The original coaleſcence and formation of theſe Marbles ſeems to have been this, that a maſs of pure marbly Spar ſunk at once in the univerſal fluid, and as the partial concretion and general coaleſcence in theſe operations of nature were two abſolutely different effects, tho' from one and the ſame cauſe, the abſence of the ſeparating fluid; they here happened to fall too cloſely on one another; the natural concretion of the particles not beginning till on or juſt before the time of the ſubſidence; and the general coaleſcence of the maſs coming on immediately after, has thrown them half form'd as they were into one firm and hard maſs; I do not here take upon me to ſay what was exactly the efficient cauſe of this too early coaleſcence of the general maſs, or too late ſhooting of the particles of it, but this I well know, that carrying on the analogy between the original coaleſcence of ſtony matter according to its various nature with the artificial cryſtallization of ſalts; I am able to do juſt the ſame thing in the latter, that nature has in the former; for, by ſlowly evaporating a water highly impregnated with any Salt, and afterwards ſuffering it to begin to cryſtallize, when a few perfect Cryſtals are form'd, if the whole be ſet on a ſlow heat, and carefully evaporated to a dryneſs, the maſs will be in Salt juſt what this Marble and the others are in Spar, a congeries of particles in which it will be eaſy to find what ought to have been the determinate figure of each, many of the Cryſtals firſt form'd remaining unalter'd in their ſhape, and many of the reſt approaching to the ſame figure, but forming in the whole the like irregular, complex and mutilated figures.

Italy has always been famous for the production of this Marble, and furniſhes us with vaſt quantities of it to this day.

SECT. II. Plain yellowiſh MARBLE.

1. *Marmor duriſſimum, lucidum, pallide flavum.* *Hard, pale yellow, gloſſy Marble.*

This is the Marmor Specie Mellis aut Terebinthinæ Cæſalp. de Met. 95.

It is a very beautiful Marble tho' but of one plain colour, and I have often wonder'd, that it is not more imported into England than it is, for it is here a great curioſity if one meets with a piece of it.

It is a very fine, ſmooth and even Marble, of a cloſe, compact and firm texture, conſiderably heavy, and of a very agreeable pale yellow, between the colour of honey and that of Venice turpentine; this is its native hue, and it keeps more ſtrictly to it than any other ſpecies of the Marble kind: it breaks readily in any direction, and leaves a ſmooth and gloſſy tho' not a ſparkling ſurface, and is of a very conſiderable hardneſs, and capable of an extreamly fine poliſh; it will not at all admit water into its texture.

It will not give fire with ſteel.

It ferments but ſlightly in Aqua Fortis, and is but in part diſſolved by it.

It burns to a fair pale red.

Examin'd by the Microſcope, it appears an even and equal ſubſtance throughout, very bright and gloſſy, tho' at the ſame time very opake, and is evidently compos'd of a mixt maſs of Spar, Cryſtal and a yellow argillaceous Earth, which moſt intimately uniting in their firſt concretion, ſubſided together and form'd this pure, and appearing homogene maſs.

It is dug in many parts of Italy, and is in ſome eſteem there, but, however it has happened, is of no great repute in other places; the fine red vein'd Syena Marble, hereafter to be deſcrib'd, muſt be acknowledged ſuperior to it, even in the colour of its ground, for this is much paler; but whoever has obſerved the fine effect the yellow part of that has among other Marbles, will eaſily conceive this would be worth working here.

The ſtrata of this have never any veins, not ſo much as of white ſo far as I have yet been able to learn: and this may properly be accounted one kind of beauty.

SECT. III. Blueiſh and black MARBLES.

1. *Marmor ſubcæruleum, ſplendidum, durius; quod Marmor Numidicum Antiquorum.*

Hard, ſhining, blueiſh Marble; the Numidian Marble of the Antients.

This is a Marble of but little beauty, but ſingular in its remarkable hardneſs, and capable of an extreamly bright poliſh; it ſeems to have been one of the firſt Marbles us'd by the Romans in their pavements.

It is the Marmor Numidicum, Plin. V. 2. p. 732. Cæſalpin. p. 91. Salmaſ. in Solin. p. 395, and of other Authors.

It is a very hard and ſtrong Marble, of a cloſe, compact and even texture, very heavy, and of a pale aſh-colour'd blue, of an irregular ſurface when broken, and conſiderably bright and ſhining, tho' not compos'd like the former kinds of any diſtinct firſt concreted particles, but one pure homogene maſs; it is very little pellucid unleſs in very thin pieces, and remarkably hard, and not to be by any means crumbled into a Gritt; water poured on it enters not at all its ſurface.

It will not give fire with ſteel.

It ferments very violently with Aqua Fortis.

It burns to a pure white.

Examin'd by the Microſcope, it appears not like the former an aſſemblage of firſt concreted particles combin'd into a maſs, but one pure homegene and regular bed of a marbly Spar, conſiderably bright, and a little pellucid, but much leſs ſo than any of the former.

It is found in Italy, Spain, France and Germany, and no where ſo plentifully as in the laſt kingdom; it generally lies there in immenſe ſtrata over beds of Clay.

It is a fine, ſtrong and durable Marble, but its want of variety makes it but little eſteem'd.

2. *Marmor duriſſimum, nigrum, ſcintillans; quod Marmor Luculleum Antiquorum.*

Hard, black, ſparkling Marble; the Lucullean Marble of the Antients, and the black Namur Marble of the Moderns.

This is a very hard and ſtony Marble, but like the precedent for want of variety, is leſs eſteem'd than many others; it is the Marmor Luculleum of Pliny, Vol. 2. p. 732. Salmaſ. in Solin. 395. Cæſalpin. 91. Boet. 495. and is call'd by the Spaniards *Buga.*

It is a very fine and ſmooth Marble, of a cloſe, compact, firm texture, and very heavy, of a good deep black, and full of fine, but ſmall gloſſy particles, appearing like ſo many ſmall ſpangles; it ſeems to the naked eye perfectly opake, and compos'd of one homogene ſmooth maſs, is very hard, and not to be reduced to gritt, or crumbled without violent force; water pour'd on it does not enter its ſtructure.

It will not ſtrike fire with ſteel.

It ferments very vehemently with Aqua Fortis.

It readily burns to a pure white.

Examin'd by the Microſcope, it diſcovers a texture not viſible to the naked eye, and inſtead of the ſmooth uniform ſurface, it gives before that, the appearance of a very rough one, irregular with a multitude of prominent particles; theſe are all very ſmall, approaching to a parallellopipeds figure, and lodg'd indiſcriminately, and at all angles in a maſs of the ſame matter with themſelves, that is, a Marbly Spar; the origin of this Stone ſeems therefore to have been, that a quantity of its conſtituent matter in extreamly ſmall Moleculæ ſubſiding to the bottom of the fluid it was ſuſpended in, remain'd in a ſoft ſtate ſo long that a great part of it concreted into its natural form, that of a number of parallellopipeds; but that before it had all acquired that formation the matter condens'd, harden'd and ſhrinking in bulk on the abſence of a part of its original moiſture, compreſs'd and cruſted together the newly form'd particles, and join'd them by a cement of the ſame matter unconcreted.

It is found in many parts of the world; Pliny tells us, that the Roman Conſul Lucullus, from whom it had its name, as he was the firſt who brought it into uſe in Rome, imported it from a certain iſland; but the name of it is ſo differently given us in the different copies, that there is no being ſure of where it was, it is in ſome Nilus, in others Melos, in others Chios, and in the common editions, in Inſula Nili: but whence ever he had it, we now receive it in plenty from Italy, Germany and many other places, there are particularly vaſt quantities of it about Namur, and with our maſons, it is generally known by the name of Namur Marble.

It is very hard, and takes a fine poliſh; the Spaniards uſe the powder of it to heal freſh wounds.

3. *Marmor duriſſimum, nigrum, læviſſimum, hebes; quod Marmor Chium, & Lapis Obſidianus Antiquorum.*

Dull, ſmooth, hard, black Marble; the Chian Marble, and Obſidian Stone of the Antients.

This is a very hard and fine black Marble, and beſide the many uſes which the Antients put it to, is well known among us as a touch-ſtone; ſeveral of our goldſmiths being furniſh'd with nothing better than a piece of it for ſuch uſes: any black Marble of tolerable hardneſs will anſwer this purpoſe, but none ſo well as the next deſcribed.

This is the Chian Marble of Theophraſtus, p. 21. the Marmor Chium and Lapis Obſidianus of all the Antients, and of the later writers Aldrov. Muſ. Met. 750. Boet. 494. Cæſalpin. 91. &c.

It is a very fine and elegantly ſmooth Stone, of a cloſe, compact texture, very heavy, and of a fine gloſſy black, perfectly ſmooth where broken, but dull, and abſolutely deſtitute of ſplendour, compos'd of no viſibly diſtinct particles, but appearing one pure, unmix'd, homogene maſs; it is extreamly hard, cuts very difficultly, but very ſmoothly and evenly, and is capable of the higheſt poliſh of perhaps any of the Marbles; water cannot at all ſink into it.

It will not give fire with ſteel.

It ferments very ſtrongly with Aqua Fortis.

It calcines to a pure white.

Examin'd by the Microſcope, it appears one plain, equal and uniform maſs, of a moſt pure and compact texture, and not ſpangled with the ſmalleſt ſpeck of ſparkling matter, but view'd in thin pieces and in a ſtrong light, looks ſomewhat tranſparent at the edges, and of a paler or greyiſh colour.

The original coaleſcence of this ſeems to have been owing to a very ſimple proceſs in nature, no other indeed than its conſtituent matters ſinking in extreamly ſmall, and to us imperceptible particles, and at once coaleſcing into the maſs we ſee it in; without any ſubſequent concretions as in the former inſtance. It ſeems compos'd of a marbly Spar, highly ſated with a black earth, and by that perhaps prevented from making the proper arrangements of its particles.

It was brought by the antient Greeks from the Iſland of Chios, and from ſome parts of Æthiopia; we have it now from Italy. It was famous among the Antients for making reflecting Mirrors, which the high poliſh it is capable of makes it extreamly fit for; and I have ſeen pieces of it that might ſerve all the purpoſes of a looking-glaſs. Cæſalpinus affirms the ſame of it, p. 91. *Adeo atrum ut cum perpolitum eſt ſpeculi modo ſynceras imagines reflectat*, are his words. The name Obſidianus was no other than a falſe ſpelling of Opſianus, ὀψιανὸς ἀπὸ τῆς ὄψεος. See Theoph. Ed. N. p. 24.

All the Accounts of the Antients concur to ſhew that their Obſidianus and Marmor Chium were abſolutely the ſame ſubſtance, which they often deſcribed under indifferently the one or the other of theſe names.

4. *Marmor nigerrimum, duriſſimum, columnare; quod Baſaltes & Lapis Lydius Antiquorum.*

Hard, black, columnar Marble; the touchſtone of the Antients; the Giants cauſeway of Ireland.

The Balſaltes and Lapis Lydius of the Ancients were evidently the ſame, the one found in its beautiful and natural columnar figure, the other in broken pieces, as many fragments of Marbles of all kinds are found to this day, in the beds of rivers; and the Antients not attending to their being the ſame thing, choſe the river kind as moſt ready to uſe on theſe occaſions.

It is the Baſaltes, Plin. v. 2. p. 754. Baſanites Ejuſdem p. 752. as alſo the Coticula Lapis Heraclius, and Lapis Lydius, of the ſame Author, p. 626. Baſaltes, Salm. in Solin. p. 394. and the Lapis Lydius and Heraclius Ejuſdem. p. 776. The Paragone Lapis Lydius and Baſaltes Cæſalp. p. 91, 92. Baſaltes Boet. 496. Lydius Lapis Ejuſdem, p. 498. and the Baſaltes Aldrov. Muſ. Met. 750. I give theſe different Synonyma, that the learned reader may have an opportunity of obſerving that there is not the leaſt diſagreement in theſe Authors accounts of the Stone, tho' under theſe different names; Salmaſius indeed boldly charges Pliny with an error in affirming the Lapis Heraclius, and Lydius, to be the ſame Stone; but I have elſewhere proved Pliny to be perfectly right, and the critic only in an error; nothing can lead us more to a knowledge of the Foſſils of the Antients than the aſcertaining their ſynonymous terms, many of which as in the preſent inſtance they did not themſelves know to be ſuch, and therefore we are more likely without great care to err about them.

This is a very elegant and beautiful Marble, of a perfectly fine, ſmooth and equal texture, moſt remarkably hard and heavy, and of a fine deep and naturally gloſſy black, reſembling that of fine high poliſh'd ſteel, and mix'd with no other colour, nor any extraneous matter of any kind; it is compos'd of no viſible particles, but is one ſmooth homogene maſs; but the moſt remarkable quality of this Marble is its figure, it is never found in beds of ſtrata, or quarries like the other Marbles, but every where wherever it has yet been found either by the Antients or ourſelves, is ſeen ſtanding up in the form of regular angular columns, compos'd of a number of joints, one placed on and nicely fitted in to another, and a number of theſe columns nicely and exactly placed together; and ſo join'd that the prominent angles of the one pillar fit, and fall exactly into the hollows left between two others, and the plain ſides exactly anſwer to one another, the whole appearing as if form'd by the hands of the moſt regular and ſkilful workmen; a number of theſe columns thus join'd make one large pillar, and generally there are found ſeveral of theſe pillars at ſmall diſtances from one another; the ſingle columns, tho' all angular, are far from being all alike, ſome of them are of ſeven, ſome of ſix, ſome of five and others of four angles, but theſe laſt are obſerv'd to be the rareſt.

This is the account not only of all the Antients, but of every one who ever ſaw the Baſaltes in any part of the world; and when we conſider this, is it not amazing, that when that noble and amazing quantity of it called, *The Giants Cauſeway in Ireland*, was lately taken notice of, it ſhould be doubted whether it were not a work of art; and the name of the Baſaltes which alone accounts for it, be never thought of? The deſcriptions the antients have join'd to give of the Baſaltes, as collected by de Boet, are as good a deſcription of that very ſtupendous quarry, if I may ſo call an aſſemblage of Stone above ground, the Giants Cauſeway, as if made for it; *Creſcit Baſaltes forma & Craſſitudine Ligni Mediocris, ſingularis quidem vero copioſus, atque ita junctus coaptatuſque veluti ſi a fabro lignario commiſſus eſſet, ſeptem, ſex, quinque nonnunquam ſed rarius quatuor habet angulos, figura eſt trabis erectæ foris lævis & tactu minimè aſper.* Would not one think the Author of this had been ſitting down by, and writing a deſcription of the very Giants Cauſeway in Ireland; and yet this is the joint teſtimony of every one who ever ſaw Baſaltes in any part of the world, and may teach us to know that immenſe pile to be no miracle, no work of art, but a natural curioſity, a collection of the Baſaltes, and that perhaps the nobleſt in the world.

It is one of the hardeſt of the Marbles, water does not at all pervade it.

It will not ſtrike fire with ſteel.

It ferments the leaſt and moſt ſlightly of all the Marbles in Aqua Fortis, and is in the leaſt degree diſſolved by it.

It burns to a pure white.

Examin'd by the Microſcope, it is ſeen to be one pure, ſmooth, homogene and perfectly opake maſs.

Its origin and formation have puzzled all the world hitherto; but perhaps when we proceed upon the principles that have hitherto helped us to explain in parallel caſes, we ſhall find this leſs difficult than it may at firſt appear to be. Foſſil bodies have many of them we know, the property of arranging themſelves like ſalts in cryſtallization into particular figures; this is from the ſame principle in nature that ſalts do it from, and I flatter myſelf will be in ſome degree explain'd hereafter; we know according to this principle, that Cryſtal and Spar ever form angular figures, the one hexangular, the other moſt uſually trigonal on parallellopedids; the combination and mixtures of theſe in different degrees, muſt naturally produce mixt figures according to thoſe degrees; and a third ſubſtance tho' in itſelf not diſpos'd by nature to aſſume or arrange itſelf into any particular figure, if mixt with theſe, may be able to ſpread, extend and enlarge, or otherwiſe alter their figures.

A mixture of three bodies is therefore capable of producing a fourth of a figure different from that of either of the three alone; and the quicker or ſlower paſſing off of the fluid it was ſuſtained in, may influence alſo the figure.

The Marble of the Giants Cauſeway analys'd by acids, is found to be compos'd of an admixture of Cryſtal, Spar and Earth, the Spar is abſolutely diſſolved and taken up by the acid, and may be precipitated from it, and procur'd pure alone, and the remaining maſs after the ſolution of the Spar is found to be pure Cryſtal, and an Earth much the ſame with the black Northamptonſhire pipe clay; we know what the figures of the bodies produced by theſe alone would be, and may thence deduce what may be the poſſible conſequences of their union, and the different manner of their concretions.

The Baſaltes was originally found in columns in Æthiopia, and in fragments in the river Tmolus, and ſome other places; we now have it frequently both in columns and ſmall pieces in Spain, Germany and Ruſſia; about Dreſden there are many columns of it; in Sileſia it is very common, and in Poland there are ſome columns of it, but the nobleſt ſtore in the world, ſeems to be that in Ireland, where it riſes far up in the country, runs into the ſea, croſſes its bottom, and raiſes again on the oppoſite land; and where it ſeems to begin in Ireland, I find, is but its place of riſe higher from its bed; for, a gentleman at many miles diſtance in digging for a well, has met with a vaſt compound column of it at 20 foot deep in the earth, ſo that how far this immenſe chain of it reaches, is not to be determined.

It is a fine touch-ſtone, and uſeful on a thouſand other occaſions where hardneſs is neceſſary in a Stone.

SECT. IV. The Plain Green MARBLES.

1. *Marmor durius, vireſcens; quod Marmor Lacedemonium Antiquorum.*

Hard, green Marble; the Lacedemonian Marble of the Antients.

This is a very elegant and beautiful Marble, and as it may be had in plenty in our own dominions, well worthy the attention of our workmen.

It is the Marmor Lacedemonium, Plin. 733. Aldrov. Muſ. Metal. 752. Cæſalpin. 93. Boet de Boot. 500.

It is an extreamly fine Marble, of a cloſe, compact texture, very hard and heavy, and of a fine bright green, when poliſh'd it is the brighteſt of all the green Marbles, and is peculiarly ſingular in this, that the colour is not equally and regularly diffus'd thro' it, but leaves in the maſs many ſpots and lines, very bright and pale, and others of a much deeper green than the general colour; this has made ſome erroneouſly imagine it of the Ophites kind, but there is truly no colour but green in it, tho' that is much diverſify'd in degree, ſome approaching even to black, and others to whiteneſs; it has no glittering ſpangles, nor any other variety of texture or colour than what merely reſults from the different quantity of the matter it is ſtained with, and is compos'd of no viſible Gritt, or diſtinct Granules, but is one uniform ſmooth maſs. Water poured on it, has no power to pervade its ſtructure.

It will not readily ſtrike fire with ſteel.

It ferments very violently with Aqua Fortis.

It burns to a pure white.

Examin'd by the Microſcope, it appears a very beautiful object, it is one plain and fine uniform maſs, and very finely tranſparent, the paler parts of it reſembling ſo many occidental or Bohemian emeralds, the darker being a little more opake.

The conſtituent matter of this Marble ſeems to have coaleſc'd into a maſs while in extreamly ſmall corpuſcles, and to have been half concreted before the matter which colours it, was received into it; which was probably from ſome colour'd earth ſettling upon it afterwards, the ſucceeding coaleſcence of the Stone ſeems to have driven this imperfectly mixt colour into different parts, and according to its quantity, it ſeems to have given a pale pellucid, or deep and ſomewhat opake green to the different parts of the maſs.

It was originally found in Ægypt only, and that not in entire ſtrata, but in large ſeparate nodules, pieces waſh'd from ſtrata, and left on the ſurface, or buried in the earth, and was greatly valued. It has been ſince found in Germany, Sweden, and England. About Briſtol there is a ſtratum of it, four or five miles from the hot Well; and in Wales are many, and thoſe conſiderably thick ones, ſo that it may be had in almoſt any quantities; the Antients eſteem'd it greatly. Pliny calls it, *pretioſiſſimi Generis cunctiſque hilarius*; and I believe if our workmen would once try it, its beauty would recommend it ſufficiently to them, and bring it perhaps very advantageouſly into uſe.

It would be extreamly elegant in tables, chimney pieces, and many other ornamental works, and is of a hardneſs that makes it well worth the trouble of poliſhing highly.

DIVISION II.

Marbles of ſingle colours, commonly found containing Shells, Corals, and other Marine Productions.

SECT. I. Pale colour'd, or whitiſh brown.

1. *Marmor albido-fuſcum, Entrochis, aſperſum; quod Marmor fuſcum Derbienſe vulgo.*

Whitiſh-brown Marble, with Entrochi, commonly called brown Derbyſhire Marble.

This is a very ſingular, and very beautiful Stone; its conſtituent matter is a pale, fine, whitiſh-brown Marble, of a fine, compact, cloſe texture, a bright glittering hue, and compos'd of a multitude of firmly coherent Granules, very ſmall, but all approaching to a parallellopiped figure. Water has no effect on it, nor at all enters its texture.

It will not ſtrike fire with ſteel.

It ferments very violently with Aqua Fortis.

It burns to a pure white.

This is the moſt exact character I could form of the Marble, from ſuch ſmall pieces of it as with great patience and difficulty I ſeparated pure from the maſs; for in its natural ſtate it is ſo full of Entrochi and ſome other originally Marine ſubſtances, that its maſs is more than four fifths of it abſolutely compos'd of them; the ſhells or other Marine bodies in it are few and thinly ſcatter'd, but the Entrochi which are very fine and perfect, are ſo numerous, that it is amazing whence they could be all thus amaſs'd together; the various forms in which they appear in it when cut, as they are lodg'd in the Stone in all directions, make a very elegant appearance, and the multitudes of them which from the angle in which they are cut, end in a point, might eaſily lead one at firſt ſight to conclude, they were not Entrochi, but ſome other thing; if nicely examined, however, the oddeſt of them will be found to be no other than what a ſingle Entrochus may be eaſily cut into, they are of all ſizes, from the thickneſs of a large pin, to half an inch or more; they take a very elegant poliſh in the maſs, and when it is broken, appear very bright, and of a beautiful plated texture; theſe as alſo the ſubſtance of the Marble anſwer all the characters of Spar.

They will not ſtrike fire eaſily with ſteel.

They ferment violently with Aqua Fortis.

And calcine to a perfect whiteneſs.

Examin'd by the Microſcope, the Marble itſelf appears a pure congeries, of a fine and ſmooth marbly Spar; and the Entrochi afford a very pleaſing object, they are in all reſpects like thoſe found looſe in clay, except that they are compos'd of a ſomewhat leſs pure and pellucid Spar; they have all a ſmall central cavity, fill'd up with a duſkyer matter than the reſt, and are compos'd of a plated matter, of a pale whitiſh colour, and conſiderably opake, diſpos'd in pretty regular horizontal flakes lying cloſely on one another, but very ſlightly cohering together; theſe flakes if carefully ſhatter'd and afterwards view'd with good glaſſes, will be found compos'd of a multitude of ſmall and regular parallellopipeds laid as evenly together as in the Phengites hereafter to be deſcribed; this ſtructure is alſo to be ſeen in the looſe Entrochi, but as both in that and theſe the particles are much more firmly joined than in the Phengites, it acquires a lucky blow to ſhatter and diſunite, and good glaſſes to diſcover them; after three or four trials, however, I have generally been able to ſucceeed. Theſe Entrochi muſt have fallen into a bed of Spar very ſoft, or ſuch matter have ſubſided while very ſoft on them, for their interſtices are all moſt nicely fill'd with it.

It is found in vaſt quantities in Derbyſhire, and much us'd for chimney pieces, tables, and other ornamental works about London; it is very hard, and takes a fine poliſh, but many, becauſe it is Engliſh, will not allow it to be a Marble. Derbyſhire Stone is its common name.

SECT. II. Green MARBLE with Shells.

1. *Marmor vireſcens, conchyliis frequenter aſperſum.* *Green Marble, thick ſet with ſmall Sea Shells.*

This is a Marble of extream beauty, and capable of a moſt elegant poliſh; it is of a fine, cloſe, compact texture, conſiderably heavy, and of a beautiful bright green, of one pure and ſmooth homogene maſs, and not very glittering or ſparkling: water pour'd on it cannot at all enter its pores.

It will not ſtrike fire with ſteel.

It ferments violently with Aqua Fortis, and is almoſt entirely diſſolv'd by it.

It calcines to a pure white.

This is the character of the Marble of the maſs in this elegant body, but it is every where beautifully variegated with roundiſh black lines, and pale browniſh-white ſpecks, that is, with ſmall ſea ſhells fill'd up with an impure white Spar, very earthy and opake; it wants indeed only this, to have been pure and cryſtalline, to have been the moſt beautiful marble in the world.

Examin'd by the Microſcope, it appears a very various but extreamly elegant maſs; the green or marble part is of a bright and elegant colour, perfectly pellucid, and approaching to the appearance of an Emerald; the edges of the Shells are of a fine ſhining dark browniſh black, and the matter that fills them, of a pale whitiſh brown; they are, many of them, cruſh'd almoſt cloſe together, and appear only as two narrow rims of blackiſh matter, containing the white Spar; and in ſeveral inſtances the compreſſion has been ſo great as to throw out the Spar, and mix it near the mouths of the ſhells in looſe blotches in the marble; the ſhells are all of the Tellina kind, as far as I have been able to trace them, and all ſmall.

It is plain, from their containing a matter different from the ſubſtance of the marble, that they were firſt fill'd before they ſubſided into it; this ſubſtance is in theſe as in almoſt all others, Spar; and it ſeems very probable (of which more hereafter) that Spar was the firſt ſolid matter that concreted in the once univerſal fluid; theſe ſhells, fill'd with this firſt concreting matter, probably fell afterwards into a bed of a not very different kind, but of a green colour, which had juſt ſubſided, and was to form the ſtratum of this Marble, and the weight of other ſtrata ſettling on this before thoroughly concreted, ſeems to have compreſs'd the whole, cruſh'd together the ſides of the tender and thin ſhells, and forc'd out the matter they contain'd, or a part of it, into the maſs of the ſtratum, where being both too far concreted to blend perfectly together, it remains in ſmall lumps. Reaſon declares this to have been the origin of this Marble, and experience and obſervation go far toward the confirming it, for it is ever found very deep in the earth, and under hard and heavy ſtrata. That all the ſtrata of ſtone, &c. concreted and ſubſided out of a fluid, I hope, from the many things occaſionally before obſerv'd, and from all obſervation is not to be queſtion'd; and that fluid being full of ſhells, as this Marble witneſſes, is a very plain proof, that this (out of which all the ſtrata of Stone, &c. which we are acquainted with, one or other of which is alſo continually full of ſhells) was not the original firſt fluid covering the earth at its creation, and before ſhell-fiſh, or any other creature, were yet form'd, or in being.

There are immenſe quarries of this Marble in Germany, Bohemia, and in ſome parts of France, where it is us'd in the ornamental parts of buildings.

2. *Marmor cinereo virens, conchyliis paucioribus refertum; Marmor fuſile vulgo.*

Greyiſh-green Marble, more thinly ſet with Shells; commonly call'd fuſile Marble.

This is the Marble of which the tall ſlender columns, ſurrounding the large pillars in many of our Gothick buildings, and thoſe of other nations, are made, and from the height and ſlenderneſs of thoſe columns, it has been ignorantly ſuppos'd to have been melted and caſt in moulds; the ſhells it contains, as the excellent Dr. Woodward well obſerves, are ſufficient alone to refute that opinion, ſince, if any had a mind to make a fuſile maſs for ſuch uſes, they never would have loaded it with ſuch unneceſſary and weakening things.

It is a ſomewhat coarſe and rough Marble, of an irregular but tolerably firm texture, moderately heavy, and conſiderably hard; it is of a dull and duſky greyiſh green colour. It ſcarce at all admits water into its pores.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis, and is in great part diſſolv'd by it.

It calcines to a whiteneſs.

It is ſtuck in many places with ſmall ſea ſhells principally turbinated ones, but I think not, as Dr. Woodward conjectures of the *Cochlea faſciata vivipara fluviatilis of Liſter*, they being too ſmall and too ſhort for that ſpecies, and among them are ſome of the Tellina and Pectunculus kinds; theſe are fill'd up with a whiter and purer Spar than the ſhells in the former ſpecies, and make a very pleaſing variety in the Stone.

Examin'd by the Microſcope, the Marble part is found not of ſo good a green, or any thing like ſo fair a tranſparency as that of the former, nor like it, one continued maſs, but evidently compos'd of irregular, conjunct, and mutilated angular particles, cloſely touching, and firmly adhering to one another; among theſe are many ſmall whitiſh particles in form of duſt, but nicely view'd, of the ſame figures with the reſt, and the edges of the ſhells are blackiſh, as in the former, but the Spar that fills them is much whiter, purer, and more pellucid; theſe were firſt plainly fill'd with Spar, and then ſunk into a maſs, which lay moiſt long enough to form pretty regular concretions.

There are many ſtrata of this in Derbyſhire, Dorſetſhire, and Suſſex.

Sect. III. The Black.

1. *Marmor Corallíticum, durius, cinereo nigreſcens. Hard, greyiſh black, coralloide Marble.*

This is perhaps one of the moſt elegant and beautiful marbles in the world; it is of a fine, ſmooth, and equal texture, conſiderably heavy, and of a beautiful greyiſh black, and conſiderably bright and ſparkling; not ſeeming, like many of the Marbles, of one pure homogene maſs when broken, but compos'd of many cloſely compacted particles; it is conſiderably hard, and capable of a very elegant poliſh: water pour'd on it has no effect.

It will not ſtrike fire with ſteel.

It ferments violently with Aqua Fortis.

It calcines to a greyiſh white.

It is all over ſet at ſmall diſtances with one of the moſt elegant Coralloide Porus's in the world; theſe are lodg'd in it at all angles, and in all directions, and are in general about an inch and half long, and three quarters of an inch broad, tho' many of them are ſmall, and ſome much larger; they are of a moſt beautiful ſtructure, compos'd of longitudinal plates, very fine, thin, and of a ſnow white, rang'd in diſtinct orders, and finely interſpers'd at ſmall diſtances with thin tranſverſe plates, at about the ſame diſtances from each other with the horizontal ones, and conſequently dividing the whole internal ſtructure of the Porus into ſmall ſquare cavities, and making it reſemble a net; this croſs diviſion runs thro' about three fourths of the body, the top, for about a fourth more, having none of the croſs partitions, but being compos'd of the longitudinal plates only, and having frequently, in the more perfect ſpecimens, proceſſes like wings, of a cloſe but irregular net-like texture, expanded from each ſide, near the top; it is plain that theſe Coralloide bodies, before they were immers'd in the bed of Marble, had been in a fluid, containing a thin concreting and very beautiful greyiſh white Spar; of this the net-like Plexus of the body, and the aliform proceſſes are full, but the open texture of the top part of it where there were no croſs or tranſverſe plates ſuffering the fluid Spar, and all to paſs readily thro' them, has retain'd none, but remained perfectly empty; in this condition it is plain from a view of the whole, theſe beautiful bodies ſubſided into, or ſunk together with the maſs of concreting black Marble; we find them accordingly lodg'd in all directions in it, their net-like Plexus's full of the greyiſh-white Spar, and making a very beautiful figure; and their tops, which remain'd open and empty, between the parallel plates they were compos'd of, are now fill'd with the matter of the Marble, which has inſinuated itſelf into every cavity it found in the body, but could not enter thoſe already full of Spar: This is the plain hiſtory of this elegant Marble, and according to this we find the Porus's exhibiting their texture in all its beauty, full every where but at their tops with the greyiſh-white Spar, and there with black Marble, and cut in all directions as they were lodg'd in all the maſs. Theſe bodies muſt have been form'd before the coaleſcence of this Marble, therefore this, like the reſt, was not form'd at the creation of the world, and before plants and animals were in being, but at ſome time ſince.

Examin'd by the Microſcope, the Marbly part of this appears compos'd of a multitude of concreted particles, of a greyiſh black, and very opake plated Marbly Spar, and the Coralloide bodies of a purely Coralline ſtructure, but fill'd with a very fine and thinly plated browniſh-white tolerably pellucid Spar.

It is found in conſiderable plenty in Derbyſhire, and according to Dr. Woodward, in Wales: this author has deſcrib'd it, Cat. Eng. Foſſ. v. 1. p. 21. and obſerves that Sir Thomas Greſham's tomb, in Great St. Helen's church, Biſhopſgate, is built of it.

2. *Marmor Corallíticum, nigerrimum, conchyliis aſperſum. Black, Coralloide Marble, with Shells.*

This is a very cloſe, compact Marble, of a fine, equal, and regular texture, conſiderably heavy, and of a fine, ſhining, deep black, very hard, and capable of an extreamly fine poliſh; water cannot at all enter its pores.

It will not ſtrike fire with ſteel.

It ferments more ſlightly than many of the reſt with Aqua Fortis.

It burns to a pure white.

It is very elegantly variegated with fair and perfect ſpecimens of a Coralloide Porus, approaching to the nature of the former, but ſmaller, and of a leſs elegant texture, and among theſe are great numbers of large ſea ſhells of the turbinated and bivalve kinds lodg'd in various directions; theſe are all of them the Coralloides as well as the ſhells a pure, clean, and bright white; and as the texture and matter of the others plainly ſhew'd they had been fill'd with Spar before their immerſion in the matter of the Stone, theſe on the other hand retaining now no part of their original texture, but being all of the ſame fine white Spar, plainly ſpeak that they were lodg'd in the Marble empty, and in their own native ſtate, for the cavities of the Porus and ſhells are all perfectly and regularly fill'd with the black matter of the Marble, but they have now no coralline nor teſtaceous matter about them, and are plainly, in tract of time, all periſh'd and gone, and the cavities they left in the hard and ſmooth maſs of the Marble, nicely and perfectly fill'd up with this fine white cryſtalline Spar, which now repreſents their figures as perfectly as if themſelves were there.

Examin'd by the Microſcope, it appears of a deep, fine black, perfectly opake, and ſeems to have ſcarce had time to form any concretions before its general coaleſcence; the ſhelly and Coralloide remains are of a pure and very fine pellucid Spar, and retain no part of animal or vegetable ſtructure.

It is found in great plenty in the kingdom of Ireland, particularly about Kilkenny, and is brought in great quantities to London, and us'd about chimney pieces, and other ornamental work.

DIVISION III.

Marbles which are vein'd, ſpotted, and variegated.

SECT. I. White variegated MARBLES.

1. *Marmor albo-purpureum, variegatum.*
Purple and white variegated Marble.

This is a very beautiful maſs, and in general moderately fine, but of very different degrees of purity and hardneſs in its different parts; it is in general white vein'd, ſpotted, and variegated with purple, tho' in ſome blocks the purple makes the ground, and the veins and ſpots are of the white; but in all it is more or leſs variegated beſide with large blotches of other colour'd matter, ſome of a pale red, others of a pale brown, others yellowiſh, and many of a greeniſh and yellowiſh brown; theſe pieces of matter of different colours, are abſolutely different concretions, and it often is not eaſy to ſay which of them is the connecting matter or baſis of the maſs, ſometimes they hold firmly together, at others they readily ſeparate in breaking, and often the maſs, tho' of the ſame colour, readily parts into ſeveral irregular ſtrata, evidently form'd by ſo many ſediments from a fluid made ſomewhat ſlowly after one another, the latter finding the former too far concreted for an intimate union; and between theſe, as alſo in the commiſſures of the other lumps that compoſe the maſs, it is common to ſee a matter which has the appearance of a fine ſilvery Mica. The different ſubſtances which compoſe this Marble are, many of them, in abſolutely diſtinct maſſes, evidently form'd looſe, and ſome others, particularly the purple and the white, diſpos'd in uneven, wav'd and interrupted ſtrata; the different matters which enter this beautiful compoſition are evidently different from one another in many of their qualities, but this on a nice examination will be found owing to the different nature and quantity of the foreign matter they are debas'd with, for they are all originally of the ſame marbly Spar; this in the white is moſt pure, and that part of the Marble is therefore the hardeſt, brighteſt, and moſt pellucid; the pale red follows next after this in theſe qualities, the purple is much inferior to that, and the browniſh, greeniſh, and yellowiſh very earthy, and almoſt perfectly opake; the ſilvery micaceous matter is not any thing of Talc, for it readily ferments in, and is diſſolv'd by Aqua Fortis, but is a very pure Spar, finely plated and lodg'd in all the narrow cracks and creviſes of the whole: and the general maſs may be determin'd a moderately hard Marble, capable of a good poliſh.

It will not ſtrike fire with ſteel.

It ferments violently with Aqua Fortis.

It calcines to a mix'd white, with ſome greyiſh and ſome reddiſh veins.

Examin'd by the Microſcope, the white part of this is ſeen compos'd of a number of fine white angular concretions firmly united together; the greeniſh and yellowiſh are the ſame ſubſtance debas'd with earth, and the purple ſeems imbu'd with a metalline tincture, and diſpos'd into ſomething like a ſtriated texture. According to the principles before deliver'd, this will be found of a formation in which there has come a kind of middle coaleſcence between what, to our ſenſes, ſeems the original concretion of the Granules, and the general coaleſcence of the maſs; and to have been form'd not regularly by ſubſidence and attraction, as in the plated Spars, but by attraction only, and conſequently making looſe and irregular maſſes; theſe probably were all of the ſame original ſtructure, but debas'd by terrene and other admixtures in their concretions, have form'd the nodules, which ſinking together, have made the maſs of this Marble; if theſe were conſiderably hard before they fell, they muſt remain in their original ſhapes, and be but ſlightly connected in the block; if they were ſofter, and ſubſided more immediately, they ſoon loſt their original ſhape, and ſpread into flat and more cloſely coherent veins; in ſome inſtances there is yet another ſtructure viſible in this Marble, for it has plainly ſubſided in harden'd nodules in all but its purple part, which being ſofter than the reſt, has done the office of a cement to them, and form'd itſelf into wav'd and uneven beds, according to the ſhape of the nodules riſing over, ſinking under, and ſurrounding them: of all theſe the talcy-looking particles are pure Spar ſeparated from the paſſing of water, and lodg'd in theſe almoſt imperceptible creviſes, therefore neceſſarily flat and thin.

It is the moſt common Marble of Italy; we have it brought into England in great quantities, and us'd in ornamental works.

2. *Marmor friabile, albo-fuſcum.*
Brown and white, friable Marble.

This is the ſofteſt of all the Marbles; it is of a ſomewhat coarſe and harſh texture, of a more lax conſtitution than any other of this claſs, conſiderably heavy, and of a pure ſnow white, finely variegated with ſlender lines, and veins of a deep brown earthy Spar, ting'd in ſome few places with a faint caſt of a pale red; and wherever it breaks ſhewing ſome of the talcy-looking matter deſcrib'd in the former ſpecimen, glittering with a ſilvery gloſs diſpos'd in ſmall flakes, and not unaptly reſembling calcin'd Muſcovy Talc broke into ſmall pieces: the white parts or ground of this Marble are, if nearly view'd, remarkably bright and glittering, and reſemble very exactly, pieces of the moſt perfectly refin'd loaf ſugar; they are compos'd of a congeries of irregular and mutilated angular particles, and are ſo ſoft as to be cut with a knife, and readily moulder'd between the fingers into a looſe powder: many of the Sand Stones are of this ſtructure, but this alone among the Marbles: water very readily pervades the ſtructure of this part of the Marble.

It will not give fire with ſteel.

It makes a violent effervеſcence with Aqua Fortis.

It burns to a ſnow white, even purer than before; the brown part which makes the veins is ſomething firmer, and almoſt perfectly opake.

Examin'd by the Microſcope, the white part is ſeen compos'd of a congeries of the brighteſt and moſt perfectly tranſparent particles of Spar that are ſeen in any Marble, they are very cloſely wedg'd together, eſpecially where they are not diſcernable to the naked eye, as in ſome ſpecimens of this ſpecies, tho' the Microſcope ſhews theſe pieces of the ſame ſtructure with the reſt. But tho' theſe particles come frequently into contact, they ſcarce any where cohere; ſo that in this view it is wonderful, not that the whole is ſo crumbly, but that it can poſſibly hang together at all; the brown parts are of the ſame matter, but run into a maſs together, and debas'd by a large admixture of Earth; and the Talcy looking flaky pure Spar, ſeems form'd ſince the coaleſcence of the maſs, filling up the inſenſible cracks and creviſes between the maſs and the veins, where they do not perfectly cohere; theſe cracks are not diſcernible in the maſs, but it always breaks at them, and they are always found lin'd with this foliaceous and ſilvery looking Spar, which from its place and manner of formation, cou'd not have any other form than that which it has. The maſs of this Marble has plainly been form'd of a multitude of theſe original concretions, too far harden'd before they ſubſided together, and therefore incapable of a ſtrict coherence either with one another, or with the matter of the veins, which has apparently ſubſided on the former maſs in thin ſediments, and made its way in lines among the particles, and ſmaller congeries of them: It is no wonder hence, that the veins and body of the Marble have ſmall creviſes between them, ſince by the time the matter of the former was ſettled, both had probably acquir'd almoſt all their hardneſs, and cou'd not cohere: and we well know by the ſtrata of ſtone, that all theſe creviſes will be fill'd up with adventitious Spar.

This is common in Italy, and chimney pieces, *&c.* are made of it. I have ſeen ſome which if but ſcratch'd with a pin, wou'd let fall a quantity of looſe Granules, and by the Saburræ, it may be gueſs'd, that it is not unfrequently looſe in its ſtrata.

3. *Marmora variegatum, durius, albo rubeſcens,*
Hard, variegated red and white Marble.

This is a very ſtrong and beautiful Marble; it is of a very fine, cloſe and compact texture, remarkably heavy, and of a ſomewhat blueiſh white ground, elegantly vein'd with red, brown and yellow, in regular and orderly beds; and often has a glow of a very agreeable pale red, diffus'd thro' its whole ſtructure; it has in ſome places bright ſparry veins of a cryſtalline ſplendor, and is very lucid and glittering in many parts; and is in the whole remarkably hard, and capable of a very elegant poliſh. Water enters not its pores at all.

It will not ſtrike fire with ſteel.

It makes a ſlighter effervеſcence with Aqua Fortis than many others.

It calcines to a greyiſh white.

Examin'd by the Microſcope, it appears a fine bright, and in ſome degree pellucid maſs, of a fine cloſe texture, but with a number of little particles bedded in the maſs; theſe are more pellucid and bright in the white parts than the colour'd, and moſtly ſo in the colourleſs Cryſtal like veins.

The whole, both to the Microſcope and naked eye, makes a beautiful appearance, and has evidently been form'd of a pure maſs of cryſtalline Spar, on which ſeveral colour'd ſediments falling while both were moiſt, the whole almoſt became in ſome degree colour'd; the general coaleſcence ſeems to have come on juſt as the particles were in the act of ſeparately concreting, and the lucid veins appear to have been cracks, ſince fill'd up with pure Spar: Aqua Fortis, tho' it ferments with this Marble, diſſolves but a ſmall part of it; hence it plainly contains Cryſtal mix'd among its Spar.

It is found in great quantities in Devonſhire, and we have much of it here brought from Plymouth; the ſtrata are generally very thick, and parted by few, but thoſe very wide perpendicular fiſſures.

4. *Marmor variegatum, albo cæruleum.*
Blue and white variegated Marble.

This is a ſomewhat coarſe Marble, of a large rough grain, and of a looſe and ſhattery texture; it is moderately heavy, and of a fine bright pearl colour, or ſomewhat blueiſh white, variegated with thick veins of a duſky blue, diſpos'd in irregular, but always ſomething like horizontal beds, always very numerous and large, and often making up the greater part of the Marble; the white parts, when broken, appear very bright and ſparkling, of a looſe ſhattery texture, and compos'd of large flatiſh concretions; the blue more even, regular, and of a ſmooth texture, and perfectly dull and dark; but wherever it parts horizontally in its natural cracks, it is cover'd with ſilvery looking flat thin flakes; it is of a moderate hardneſs, and takes a very elegant poliſh. Water pour'd on it ſlowly enters its ſtructure.

It will not give fire readily with ſteel.

It ferments violently with Aqua Fortis, eſpecially in the white parts.

It burns to a greyiſh white.

Examin'd by the Microſcope, it appears in the white parts, a congeries of flat ſecondary concretions, compos'd of cubic or parallellopiped Granules, and in all things perfectly reſembles the Phengites Marble hereafter to be deſcrib'd; the blue parts make a very ſingular figure; they are all tabulated, and compos'd of the ſame ſort of Spar with the others, but debas'd by a large admixture of earth, and laid together in thin foliaceous flakes; theſe are extreamly fine, innumerable in quantity, and all of the ſilvery caſt, before deſcrib'd.

This Marble attentively conſider'd, may ſerve to account for the origin and formation of many others; the white parts are regularly concreted, pellucid, bright, and perfectly diſſoluble in Acids; the blue of irregular figures, opake, dull, fermenting more weakly in, and only in part diſſoluble by thoſe Menſtrua. Is it not plain hence, that the white is the pure matter of the Marble, which has concreted into its natural figure, and retains its perfect nature; and that the blue is the ſame, debas'd by an admixture of earth, which not being diſſoluble in Acids, makes the maſs ferment more languidly in them, and by ſeparating too far the particles of the Spar, ſuffers them not to coaleſce in form, or afford their natural concretions? An obſervation which holds equally true in the colour'd veins of all the Marbles, and will hereafter be of uſe in accounting for many other things.

This is an Italian Marble; it is very common there, and is imported hither in great quantities, and us'd in houſes, monuments, and on other ſuch occaſions.

SECT. II. The Brown vein'd variegated MARBLES.

1. *Marmor pallide-fuſcum, venis albidis & rubentibus variegatum.* *Pale-brown Marble, with white and red veins.*

This is a moderately fine, cloſe and ſmooth Marble, of a firm compact texture, conſiderably heavy, and of a fair brown, variegated with white and red veins, but ſubject to great variation both in the ground and veins in the ſame ſtratum, and often in the ſame maſs. The ground is ſometimes of an equal and pure uniform brown; ſometimes it is ting'd with an admixture of yellow, and ſometimes has a whitiſh caſt, and the veins are ſometimes of a pure, ſometimes of blueiſh white; in ſome blocks theſe make the whole variegation, and in others there are only the red and none of theſe. The red are alſo of all degrees of deepneſs in colour, from red lead colour, to the purple of the Porphyry; it breaks with an uneven ſurface, and looks conſiderably bright and ſparkling in the white veins, ſomething leſs ſo in the red, and ſcarce at all in the ground; it is conſiderably hard, and takes a very beautiful poliſh. Water does not at all enter its ſtructure.

It will not fire readily with ſteel.

It ferments violently with Aqua Fortis, eſpecially in the white and red veins.

It ſuffers but little change in the fire.

Examin'd by the Microſcope, the ground appears one uniform maſs, of a marbly Spar, highly ſaturated with a brown or yellowiſh Earth, and that ſometimes equally all thro', but at others irregularly mix'd, and giving veins of deeper and paler brown. The red ſpots are of a ſmall granulated texture, tho' I have ſeen ſome of the deeper colour'd ones quite of an equal and ſmooth ſubſtance, from the greater quantity of Earth not ſuffering the particles to form their natural concretions; the white are plainly of a tabulated Spar, and obſcurely approach to the complex texture of the Phengites.

It is a common Engliſh Marble; Cornwall and Devonſhire afford it in abundance, and there are ſeveral quarries of it in Wales; It is us'd in London in tables, and other ornaments, and makes a very pretty appearance.

2. *Marmor fuſcum, albido & nigro variegatum.*
Brown Marble, variegated with white and black.

This is a moderately fine and ſmooth Marble, but of a ſomewhat ſhattery texture, and naturally ſubject to a great number of cracks and flaws, which are ſometimes viſible to the naked eye, but more frequently are only known by the maſſes breaking at them. It is moderately heavy, and of a very agreeable brown, variegated with blotches of whitiſh and very beautiful branch'd veins of black in various figures. It is ſometimes debas'd by an admixture of other colours, but theſe it always has; and it is ſometimes not eaſy to ſay, whether the brown or the white is the ground. The brown is ſometimes a clear colour, ſometimes more duſky, and ſometimes ting'd with a little yellow; and this and the whitiſh, which alſo is often no other than a paler brown, is uſually diſpos'd in irregular and odd variegations, and with the help of the branch'd figures in the black, gives frequent reſemblances of rocks, clouds, rivers and landſcapes, with many other beautiful figures, eſpecially when artfully diſpos'd in ſmall pieces. It takes a very good poliſh.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis, and is in great part diſſolv'd by it.

It calcines to a greyiſh white.

It is common in many parts of Italy, particularly about Florence, and is in great repute with us for ornamental works.

3. *Marmor fuſcum duriſſimum, albido variegatum.*
Hard brown Marble, variegated with white.

This is an extreamly beautiful Marble, and is the hardeſt of all that are properly of the marble Claſs: it is of a very fine, cloſe and compact texture, very remarkably heavy, and has naturally only two colours, a ſomewhat yellowiſh brown, and a duſky white; but there are uſually in it ſo many mixtures of theſe in various proportions, that the veins are of ſeveral very different ſhades of colours. The veins in this Marble are very beautifully diſpos'd, always running one way, which is parallel to what was the horizontal ſite of the ſtratum, but not running ſtrait, but in beautifully wav'd broad lines, elegantly repreſenting the windings of rivers. It has not, however, the advantage of trees or rocks in its figures: its ſtructure being too hard to give way either to cracks, or any other of the irregularities, which are the origin of thoſe variegations; it is extreamly hard, and capable of a very elegant poliſh.

Water pour'd on it does not at all enter its pores.

It will not eaſily give fire with ſteel.

It ferments more languidly with Aqua Fortis than moſt other Marbles.

It is not readily calcin'd.

Examin'd by the Microſcope, it is ſeen compos'd of a very beautifully angular Gritt, of a very bright ſurface, and firmly cohering one particle with another.

It is found in ſome parts of Italy, but is not common, and the hardneſs of working it, makes it leſs in uſe than it wou'd otherwiſe be.

Sect. III. The Yellow vein'd and variegated MARBLES.

1. *Marmor variegatum, elegantiſſimum, flavo purpureum.*
Elegant yellow and purple variegated Marble.

This is one of the moſt beautiful of the Marble Claſs; it is very fine, of an extreamly cloſe, ſmooth and even texture, and of a very beautiful pale yellow, variegated with veins of an elegant purple, and others which are dark, browniſh, blackiſh and white; it is gloſſy, but not glittering when broke, and is compos'd of no viſibly diſtinct particles, but of one ſmooth, even ſtructure; it is of a moderate hardneſs, and capable of the moſt elegant poliſh. Water has no effect upon it.

It will not give fire with ſteel.

It ferments pretty briſkly with Aqua Fortis, and is in great part diſſolv'd by it.

It burns to a very beautiful pale red.

Examin'd by the Microſcope, it appears a very beautiful maſs. This diſcovers, tho' the naked eye cou'd not, that its ſmootheſt parts are compos'd of infinitely ſmall Granules, concreted in regular parallellopipeds, and rang'd by a ſecondary concretion into thin foliaceous flakes as in the Phengites; theſe flakes laid nicely and evenly on one another, conſtitute the apparently ſmooth and homogene maſs of the Marble. The white veins are of the ſame ſtructure, but their flakes are more broad and thin, and of a leſs determinate figure; many of theſe are of ſo exactly the appearance of Talc, that it is not to be conceived that they are mere Spar, till the trial by Acid diſcovers it; the colour'd veins are all more or leſs loaded with Earth: this is left behind in ſolutions of them, and this prevents the regularity of their figures.

The veins in this Marble are ſo beautifully irregular, and confus'd, that it is evident, the whole maſs, veins and all, ſubſided at once, and became mingled very intimately together.

It is found in Italy, and brought to us at a great price; it were well if the quarries of our own kingdoms were thoroughly ſearch'd, for I have a ſpecimen of a Marble from Wales, which an expert workman might miſtake for this: They call this Syenna Marble, and work it into tables, *&c.* it is indeed ſo dear, that the tables of it are commonly of a coarſer matter, only cover'd with a plate of one third of an inch thick of this, and fac'd with another of an inch deep.

2. *Marmor variegatum flavo cæruleum.*
Blue and yellow variegated Marble.

This is a leſs elegant Marble than many of the others, tho' of a very pleaſing variety in colour, but is leſs eſteemed by our workmen than the reſt, becauſe of the difficulty of giving it a regular poliſh.

It is a ſomewhat coarſe and harſh maſs, eſpecially its ground, of a looſe open texture, but conſiderably heavy; and tho' harder than many of the Marbles, yet it naturally takes the worſt poliſh of them all. Its ground is a deep ſtrong yellow, perfectly opake, and very earthy Spar; and in this are lodg'd a multitude of pieces, of a moderately fine blue marbly matter, in ſome parts ſo deep as to approach to blackneſs; in others ſo pale as to be properly grey; theſe are from one to three inches in bigneſs in general, tho' often much larger and much ſmaller, and are lodg'd at diſtances in the maſs commonly no where touching or coming near one another. Water has but little effect in entering the pores of this Marble, and that only in its yellow parts.

It will not ſtrike fire with ſteel.

It ferments violently in the blue parts, and leſs ſtrongly in the yellow with Aqua Fortis.

It burns in the former to a pale grey, and in the latter to a duſky red.

Examin'd by the Microſcope, the yellow parts appear of a moſt irregular and rude texture, compos'd of particles of indeterminate figures, and theſe drawn into frequent little combinations, receding from each other, and leaving ſmall creviſes between them; the blue are a very pure homogene maſs, of no viſible concretion into Granules, but one ſmooth ſubſtance.

It is eaſy to infer from hence, that the blue parts were Nodules which concreted ſeparately as Pebbles, Flints, &c. and that from the ſame principle, of which hereafter; and ſunk into a maſs of a yellow very earthy Spar, which coaleſcing afterwards, held them firmly together; the quantity of Earth in this is ſo great that Aqua Fortis is not able to take up more than one third of its ſubſtance, and this has prevented its forming itſelf into its natural concretions.

It is a common Marble in Spain, Italy and Africa, but no where much valu'd.

SECT. IV. Black vein'd and variegated MARBLE.

1. *Marmor nigerrimum, venis albentibus.* *White vein'd black Marble.*

This is a conſiderably fine and elegant Marble, of a very cloſe, firm and compact texture, conſiderably heavy, and of a fine deep black, vein'd with generally narrow white veins, and theſe lying not in the uncertain directions that the veins in Marbles uſually do, but generally running perfectly ſtrait and even, always horizontally in the ſtratum, and ſeeming themſelves ſo many diſtinct ſmall ſtrata or ſediments among the maſs; the whole is conſiderably and pretty equally hard in all its parts, and capable of an elegant poliſh; when broke horizontally, it looks very bright and ſparkling, and ſhews a conſiderable quantity of that flat ſparry matter, deſcrib'd in many of the former ſpecies, and looking like flakes of a ſilvery Talc; broke in a direction perpendicular to the ſtratum, it ſhews nothing of this; and this is an obſervation of ſome weight in the aſcertaining what that body is; excepting for theſe, it appears not a granulated, but a ſmooth homogene maſs in the black part, and an aſſemblage of very bright and lucid concretions in the veins. It does not admit Water at all into its texture.

It will not readily give fire with ſteel.

It ferments leſs violently than many others in Aqua Fortis.

It burns to a duſky grey.

Examin'd by the Microſcope, it appears a maſs of a fine cloſe texture, but not without evident Granulæ, and an approach to angular concretions in many places, and ſometimes among the firmeſt and blackeſt part, has a fair Granule of white; its veins are a very fair fruſtuloſe or ſhattery tabulated Spar; the plates very broad, and all lying very nearly flat to the horizontal direction of the ſtratum, tho' making irregular angles, as thoſe of all the fruſtuloſe Spars and Marbles do with one another; theſe ferment more ſtrongly in, and are entirely diſſolv'd and taken up by Aqua Fortis; the black parts of the Marble ferment more languidly, and leave a conſiderable quantity of Earth at the bottom of their ſolution.

There can be no doubt of this Marble's having been form'd by ſubſidence from a fluid even from its ſtructure; the maſſes of black have evidently been many different ſediments; which not cohering firmly, have left room for the formation of the thin flaky lucid Spar between them; they always ſplit naturally at theſe inviſible commiſſures, and always ſhew this matter on each ſide, which is no original part of, nor any where elſe ſeen in the Marble; the matter of the white veins has evidently ſubſided on one or other of theſe ſediments, after its perfect and complex concretion into compound tabulated maſſes in the fluid, and has rang'd itſelf in ſtrait even lines on the even ſurface of the already form'd ſtratum. It might be conjectur'd, that theſe veins might have been form'd ſince the body of the Marble, by Spar pervading the ſtrata with water, and filling accidental horizontal cavities; but experience contradicts it, and the horizontal cavities, and even perpendicular fiſſures in the ſtrata of Marble in general, are found empty; in Stones of a coarſer texture, cracks are frequently fill'd up thus; but thoſe of this firmneſs ſeem to admit of no adventitious particles, all the after production of theſe bodies, ſeeming to be the flaky Spar, filling the imperceptible cavities left at the original ſubſidence, from the matters being too far concreted perfectly to cohere.

It is common in Italy, and brought in great quantities to us for chimneys, tables, &c.

2. *Marmor*

2. *Marmor duriſſimum, nigro-cæruleum, venis niveis.*
Blueiſh black, hard Marble, with ſnow white veins.

This is a remarkably firm and durable Marble; it is of a ſomewhat rough and harſh texture, conſiderably heavy, and of a very agreeable blueiſh or greyiſh black, vein'd with the moſt perfectly white and bright veins of all the Marbles. It is very hard, and capable of an excellent poliſh, is ſomewhat bright and glittering where broke in the black part, but ſhews not the leaſt appearance of ſeparately concreted Granulæ, and in the white veins is very glittering and compos'd of a ſhattery tabulated Spar, the plates like thoſe of the former ſpecies lying in as much regularity as the texture of this kind of concretion will allow in an horizontal direction in the ſtrata; water cannot at all pervade or enter the ſtructure of this Marble.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis in its white parts, and conſiderably more languidly in the black.

It burns to a mixt grey.

Examin'd by the Microſcope, its veins appear the ſame ſubſtance with all the fruſtuloſe Marbles and Spars, no way differing from the Phengites but in hardneſs and colour, and the black appears a very fine and pure homegene ſmooth and equal maſs.

It is common in Italy, and imported in great quantities from Leghorn, our workmen make tables, &c. of it, but complain much of the hardneſs of its white veins.

3. *Marmor variegatum, nigro luteum.*
Black and yellow variegated Marble.

This is a Marble in common uſe, and great eſteem among us; it is of fine, even and cloſe texture, very heavy, not at all glittering or ſparkling where broken, but of a fine deep dead black, variegated with a multitude of irregular veins of yellow, of moderate breadth, and generally with a few ſmall and ſlender white ones beſide; the jetty black and ſmooth texture of the Marble, ſeem to promiſe the excellent poliſh it will take, and the little white veins are very lucid, but the yellow tho' the moſt beautiful that can be conceiv'd when poliſh'd, are in the rough maſs the moſt unpromiſing things imaginable; they are here perfectly opake, of a poor, pale, browniſh yellow, and ſeem only ſtreaks of a dirty clay; the whole maſs reſiſts the entrance of water.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis, but in different degrees in the different ſubſtances, moſt of all in the white veins, leſs in the black maſs, and leaſt and for the ſhorteſt time in the yellow; the whole is of a very conſiderable hardneſs, and takes a high poliſh, the yellow veins looking like gold, and the white like ſtreaks of ſilver; but theſe laſt are ſmall, few in number and often abſolutely wanting.

Examin'd by the Microſcope, it appears a very elegant maſs, the black part is one pure, even ſubſtance, form'd in no viſible concretions, but conſtituting one equal maſs; the white veins are of a ſomewhat ſhattery and tabulated Spar, very bright and ſparkling, and the yellow veins now ſhew why they appear ſo beautiful when poliſh'd, for they here appear not as to the naked eye an opake clay, but a congeries of yellow angular and tolerably pellucid Granules of Spar, debas'd by a conſiderable admixture of earth, and not unaptly reſembling the Phengites Marble, but in their want of the complex tabulated ſtructure, and having a leſs degree of tranſparence; they are unqueſtionably the ſame matter with that elegant Marble, only too much ſaturated with earth, which makes them dark, and prevents their farther concretions; the conſtituent matter of them ſeems to have fallen after an imperfect coaleſcence into an already form'd bed of the black maſs while very ſoft, and to have ſpread itſelf wherever it found way, tho' too hard to blend perfectly into a maſs with it.

This is a Marble brought to us in vaſt quantities from Italy, and much eſteem'd and uſed.

4. *Marmor nigricans, venis albis, & cinnabarinis.*
Black Marble, with white and red veins.

This is a very firm and valuable Marble. It is of an irregular but very compact texture, conſiderably heavy, and of a beautiful variety of colours; its ground is black, ſometimes deeper, ſometimes blueiſh or greyiſh, and its variegations, for they are too wild and irregular to be properly called veins, are the far greater number of a fine, clear and bright white, and ſome of moſt beautiful high cinnabarine red; the whole maſs appears very bright and ſparkling wherever broken, but the cinnabarine veins moſt of all ſo; and the mixt matter of the whole is ſo blended, that in many places it is not eaſy to determine whether the white or the black be properly the ground; the red veins generally appear of a granulated ſtructure, the reſt perfectly ſmooth and even, and the whole very hard, and capable of a fine poliſh; It will not at all admit water into its ſtructure.

It will not give fire with ſteel.

It ferments pretty briſkly in all parts, but leaſt of all in the red with Aqua Fortis.

It burns to a mixt grey,

Examin'd by the Microſcope, it appears a congeries of very pure and fine ſparry matter, part blackiſh and part white, irregularly placed together, and all firmly cohering, all of a ſmooth even texture, and not at all granulated, the red veins only appear of this complex ſtructure, and are plainly a tabulated Spar of the Phengites kind, only tinged with a metalline colour. This Marble evidently affords us an inſtance of a congeries of differently colour'd Marbly Spar concreting together, ſubſiding in an irregular mixture, and ſuffering its general coaleſcence before it had time to ſhoot into particular viſible concretions.

It is dug in great quantities in Ireland, and much eſteem'd there, the poorer ſort of the Proteſtants there call it the bloody Marble, and imagine it acquired its red veins at the time of the dreadful maſſacre in that kingdom; they have an idle tradition, that tho' the ſame Marble was well known, none of it was found with red veins before that time.

It is ſometimes brought into England, but is not ſo much regarded as it deſerves.

5. *Marmor nigerrimum, venis rubris, albis & flaveſcentibus variegatum.*
Black Marble, with red, white and yellow veins.

This is a ſomewhat coarſe and rough Marble, of a firm and very compact texture, conſiderable heavy, and of a fine deep black ground, beautifully variegated with red, yellow and white in all their degrees, and diffus'd among its maſs in very beautiful irregular veins: there is a conſiderable variety in the ſtructure of the ſeveral parts of this Marble diſtinguiſhable even to the naked eye; the black is evidently tho' irregularly granulated, the red is a pure equal maſs, the yellow generally a little rough with angular Granules, and the white always of an obſcurely fruſtuloſe texture; the whole has a rough uneven ſurface where broken, and is brighteſt in the white part, the yellow and black have ſome faint ſparkling, but the red ſcarce any at all; it is conſiderably hard in the whole, and takes a tolerable poliſh; water cannot at all enter its ſtructure.

It will not give fire with ſteel.

It ferments more languidly than moſt of the others with Aqua Fortis, except in its white veins.

It burns to a pale but variegated grey.

The Microſcope confirms the judgment of the naked eye, for the red veins here appear a plain uniform maſs, the black obſcurely and irregularly granulated, the yellow ſomewhat more diſtinctly ſo tho' in very ſmall concretions, and not a little reſembling thoſe of the yellow veins of the third ſpecies; and the white plainly of the complex texture of the fruſtuloſe Spars in moſt inſtances, tho' in ſome veins I have ſeen it only in ſingle Granules, and much reſembling the texture of the white Carrara Marble; the maſs and the diſtinct matter of each of theſe veins were evidently all form'd ſeparate, the black which makes the ground of the Marble ſubſided firſt, and while it was yet very ſoft, the matter of the diſtinct veins has plainly fallen in a like ſoft ſtate into it, and thence it is, that it has thus vaguely and irregularly diffus'd, broke and ſpread itſelf in each inſtance among the black, and given us theſe beautiful variegations.

It ſeems a Marble peculiar to our nation; it is no where in Italy, nor do the Germans know it, ſo far as I can yet learn; we have it in Devonſhire, Cornwall, and ſome other counties, and in particular about Plymouth there are immenſe quarries of it.

It is work'd into chimneys, tables, &c. and is a very beautiful Marble.

SECT. IV. Green, vein'd and variegated MARBLES.

1. *Marmor vireſcens, variegatum, venis albicantibus; quod Marmor Tiberium & Auguſtum Romanorum.*

White vein'd, green, variegated Marble; the Tiberian and Auguſtan Marble of the Romans.

This is the Marmor Auguſtum & Tiberium, or Auguſteum and Tiberianum, Plin. L. 36. Vol. 2. p. 733. Boet. 500. and of other authors; for theſe were evidently the ſame ſpecies, the different diſtribution of their white veins which was all they differ'd in, being merely an accidental variety: If we were to make diſtinct ſpecies of all ſuch trivial varieties, we muſt have as many ſpecies of Marbles almoſt as we have blocks of them.

It was a Marble much eſteem'd among the antient Romans, and is not leſs valued at this time; it is a rude, irregular and various maſs, of a firm, compact texture, and remarkably heavy; it may properly enough be called a green and white Marble, becauſe thoſe are the conſpicuous colours; but it has theſe mix'd in ſo many ſhades as to cauſe a moſt pleaſing variety, and has beſide theſe, many ſpots and veins of a deep duſky colour, approaching to a black; it is conſiderably lucid and glittering where broken, and very variouſly ſo in its various parts, the white being much the brighteſt, and the other colours poſſeſſing this quality pretty regularly according to the paleneſs of their tinge; it is in the whole of a very conſiderable hardneſs, and capable of a ſufficiently elegant tho' not perfect or equal poliſh; it is not compos'd of any regular ſmall concretions, but of a multitude of large quantities of differently colour'd ſmooth maſſes, intimately interwoven among, tho' not blended with one another, and among theſe has a multitude of truly talcy particles, of a fine green, a fair foliaceous texture, and raiſing no effervеſcence with Aqua Fortis; it admits water a little in ſome parts of its pale veins.

It will not give fire with ſteel.

It ferments briſkly in all its parts except the green flaky ones with Aqua Fortis, but moſt violently in the white.

It burns to a mottled grey.

Examin'd by the Microſcope, it appears a ſtrangely mixed maſs, compos'd of a multitude of variouſly colour'd parcels of matter, but almoſt all nearly of the ſame texture and external form, and theſe not form'd in diſtinct nodules, and cemented by a different matter, but all parts of one continued quantity, and variouſly running among one another; many particles of it naturally flake off in ſmall flat pieces, and exhibit a plainly foliaceous plated texture; all theſe are a true green talc, the white parts ſomething approach to the figure of the complex tabulated maſſes of the Phengites, but are kept from forming regular figures by their great quantity of adventitious earthy matter. There is no room to doubt but this alſo is the occaſion of the perfect irregularity in the reſt, and determines them to concrete in plain uniform earthy maſſes.

This is the only genuine Marble that I have found to contain pure talc, in many the Spar aſſumes its form, and might deceive the unwary; but from this, large flakes may be pick'd out, which both the naked and aſſiſted eye diſcover to be true talc, and which will not be diſſolved by, nor at all ferment with Acids.

This is brought to us in large quantities from Ægypt, and other places, and us'd in tables and other ornamental works; the Romans were well acquainted with it, and had it from the ſame part of the world; they diſtinguiſh'd it into two kinds from the diſpoſition and order of the variegations, and honour'd them with the names of two of their Emperors, in whoſe reigns they had firſt been brought to Rome; thoſe blocks in which the variegations were waved, and thrown into arches and circular figures, they called the Auguſtan, and thoſe whoſe white was not thus rang'd, but diffus'd and ſcatter'd thro' the whole maſs, the Tiberian: *Auguſtum ac deinde Tiberium in Ægypto Auguſti & Tiberii primum Principatu reperta, Auguſtum undatim criſpum in Vertices; Tiberium ſparſa non convoluta canitie.*

2. *Marmor vireſcens, durius; venis, & maculis, nigris & albicantibus, variegatum; quod Ophites niger Antiquorum.*

Black and white ſpotted green Marble; the black Ophites, or Serpent-Stone of the Antients.

The uncertain accounts the Antients have given of the Ophites, have made many unlucky miſtakes about what they meant by that name; ſome have imagined they meant by it a black, and others a white Marble; a more accurate ſurvey of their works together, will ſhew, however, that they in reality knew three ſpecies of Stone only by this name, and that they were far from confounding them one with another; theſe were the two green Ophites, and the grey kind; the green they divided into two kinds very juſtly from its different hardneſs, and its black and white variegations; and each of theſe they knew by the common name of Ophites, diſtinguiſhing them only from each other according to the colour of their ſpots, and called them thence the black, that is, the black ſpotted, and the white or white ſpotted Ophites; the grey was an entirely different Stone, and was the Tephria deſcrib'd in its place: this hard green Marble here deſcrib'd was therefore the true black Ophites of the Antients, the Ophites nigricans, Plin. V. 2. p. 733. Ophites Salm. in Solin. 221. Ophites Aldr. Muſ. Met. 752. Ophites Veterum, recentiorum Serpentina. Boet. 501. the Ophites Thebanus of Lucan, and the Ophites of Iſidore: Dionyſius Heſychius and all the old ſcholiaſts: The οφιτης of the Greek proſe writes, and οφιτις of the Poets.

It is a very beautiful and conſiderably hard Marble, of an irregular but very cloſe, compact, and firm texture, remarkably heavy, and of a very fine green, elegantly variegated with ſmall black ſpots and irregular lines, and ſometimes with white ones; theſe are frequently ſeen together, and ſometimes in diſtinct blocks, and make white ſpotted and black ſpotted Stones; but the diviſion of the Antients, into the black and white Ophites, was not founded on this, but on their different hardneſs; theſe were both call'd black Ophitæ by them, and their white kind was a different Stone, to be next deſcrib'd: Theſe ſpots and variegations are ſometimes found conſiderably large, and half blended with the general matter of the maſs, but then the whole is much leſs beautiful. There is indeed no Marble ſubject to ſo many accidental variegations as this, ſometimes the ground is perfectly green, ſometimes paler, from a greater admixture of earthy matter, and ſometimes, as in much of the Ophites of Italy and England, ſtain'd with a bluſh of purple, evenly diffus'd thro' it; all theſe varieties indeed ſometimes appear in the ſame maſs, and beſide theſe it frequently contains broad veins of the true Aſbeſtos. Notwithſtanding all theſe differences, however, which might lead an inaccurate obſerver to conſtitute as many ſpecies, the Stone is really the ſame in all; and its orderly diſpoſition of its variegating matter in ſpots, and its anſwering to the ſame characters, will ever determine both the ſight and reaſon to acknowledge it, in all theſe circumſtances, but one and the ſame thing. It has a little brightneſs when freſh broken, but is of a conſiderably even and ſmooth texture, moderately hard, and capable of a very beautiful poliſh.

It does not at all admit water into its ſtructure.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis, and according to its purer or more debas'd compoſition, is more or leſs diſſolv'd in, and taken up by it, for when pureſt it is abſolutely and entirely ſo.

It burns to a mottled grey.

Examin'd by the Microſcope, it appears in the green parts a more or leſs pure, but even and regular maſs, not form'd into any appearance of Granulæ; the black ſpots are very bright, and compos'd of a multitude of angular concretions, very ſmall and irregularly laid together, without running into any ſecondary figures, and the white are plainly form'd of ſecondary coaleſcences of angular particles into an irregularly tabulated Spar; the redneſs or other colour of the ground is, from earthy or mineral matter, taken up into, and diffus'd among the matter of the maſs, and renders it more opake and impure. It is eaſily determin'd hence, that the ſpots of this were firſt form'd looſe nodules, and afterwards ſubſided into the concreting maſs of this Marble; where this happen'd at a time when both were ſoft enough to blend with one another, the whole became an impure green Marble, not known by this name; where they were too hard for this union, they became firmly united in the maſs; the general coaleſcence of which appears to have been very ſudden, from the matter of the maſs not having had time to form itſelf into ſeparate Granules, and thus they made the black Ophites.

The Antients have indeed been miſunderſtood to mean, by the names of black and of white Ophites, Marbles of thoſe colours; but whoever will carefully examine them, will find that this was only meant of the ſpots, for that the general colour of both was green, like the ſo famous green Lacedemonian Marble, Pliny, l. 36. c. 7. ſays, *Lacedemonium viride cunctis que hilarius ſic & Auguſtum Tiberiumque*; and then tells us, that their only difference from the Ophites was, that *cum ſit illud ſerpentium maculis ſimile hæc maculas diverſo modo colligunt:* Is it not very evident from this, that what was then call'd plainly and ſimply Ophites, was green, ſince he here tells us that the common green Ægyptian Marble, laſt deſcrib'd, and which I have already mention'd to have white and dark variegations, differ'd from the Ophites in nothing but in the arrangement and diſpoſition of them? I preſume, if the Ophites had been either a black or a white Stone, he would have mention'd that its general colour, as its difference from the green Marble of Ægypt, or indeed would have never nam'd it on this occaſion at all; but he plainly tells us, that it was like the Ægyptian in all things but the diſpoſition of its variegations; that is, that it was expreſſly green, ſpotted with white and black; and yet it is this very author, whoſe following words, *Duo ejus genera candidum & nigricans*, tho' plainly meant only of its ſpots, for the name Ophites determin'd its green colour, have been the occaſion of all the errors about it; and in this ſenſe of the ſpots, and not of the baſis of the Marble, are all the Antients to be underſtood of their black and white Ophites: Dioſcorides indeed gives a farther proof of this for mentioning, after the Tephria and black Ophites, as it is always call'd by the Antients, the white one, he does not ſay that it is white in the whole, but that it has white lines running along thro' it.

The Antients found this Stone in Ægypt, and knew of it in no other place; we have it now in many parts of the world, the deſarts of Arabia abound with it; it is common in the iſlands of the Archipelago, nor is our own country without it; in Wales there is ſome of it very beautiful, and the common Angleſea Marble, in which the Aſbeſtos is brought to us, is a coarſer ſort of it; Dionyſius tells us, that the Beryll was found embedded in rocks of this Stone about Babylon, in the ſame manner that Theophraſtus mentions ſome other Stones of the ſmaller and more precious kinds, to be found, Ed. noſt. p. 26. Dionyſius's words are,

Ὑγρῆς βηρύλλου γλαυκὴν λίθον ἥ περὶ χῶρον,
Φυέται ἐν προβολῆς ὀφιήτιδος ἔνδοθι πέτρης.

Which Salmaſius has the honour of being the only commentator who ever underſtood it, having been to his time tranſlated,

Hic tamen internis Ophitidis arcis inarvis
Inter Gemmiferas excreſcit creber arenas. And,
Berylli Lapidem liquidum glaucique coloris
Perloca quæ tendunt Ophianæ ad mœnia petræ.

The Antients were fond of its, I am afraid, imaginary virtues againſt the bites of ſerpents externally apply'd, and Dioſcorides commends it in pains of the head and lethargies; its vertues againſt ſerpents were very early credited in the world, for we find them recorded in the Βιβλιον περι λιθων of Orpheus; which however the caſe may ſtand with his hymns and argonauticks, I flatter myſelf I have ſtrong reaſons to prove, againſt all that the criticks have yet been able to object to what are call'd the works of this author, to be really the oldeſt Greek verſe now extant in the world; this author, however, is not for binding it on, as Dioſcorides directs, in the lump, but directs it to be powder'd and ſprinkled into the wound, and declares it, thus apply'd, to be a preſent remedy.

Μάνθανε δὲ δολιχῶν ὄφεων μὴ δειέμεν ἰούς,
Τρίψαι γὰρ λεπτὴν ὀφιούτιδα κέκλεο πέτρην,
Ἤν ποτέ τις κρατεροῖσι πεπαρμένος ἔλθῃ ὀδοῦσι,
Καὶ μιν ἐφ' ἕλκει πάσσε· καὶ ἀτρεκές ἔσσετ' ὄνειαρ.

3. *Marmor vireſcens, mollius, venis, & maculis, albidis & nigris variegatum: Ophites candidum Antiquorum.*

White and black, vein'd, ſoft, green Marble; the white Ophites, or Serpent Stone of the Antients.

This is the Ophites Candidum, Plin. v. 2. p. 733. the white Ophites of Dioſcorides and the other Greek authors, and the Marmor Zeblicium of the Germans; tho' the authors who have treated of that Stone have not perceiv'd that.

It is a very elegant and beautifully variegated maſs, of a conſiderably fine, ſmooth, and even texture, moderately heavy, and when pure of a very elegant pale green, not unlike that of the Malachites, and elegantly variegated with ſpots, clouds, and lines of a fine deep black, and an extreamly pale green, tending to whiteneſs, and not unfrequently with abſolutely white, large and fair veins; it is very ſoft, and eaſily ſcratch'd, even with a pin, but is capable of a good poliſh, looks very bright when wrought, and tho' ſo eaſily cut or ſcratch'd, is leſs brittle, and conſequently more durable in many things than ſeveral of the harder Marbles; if attentively view'd it is very bright and glittering where freſh broken, the ſhining particles are very ſmall, tho' very bright, and beſide the larger black ſpots, millions of ſmall ones are diſcover'd, ſcarce of a ſize to be viſible, but plac'd very cloſe together, and giving a general darkneſs to the places where they abound.

It ſlowly and ſlightly admits water into its pores.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis.

It burns to a duſky grey.

Examin'd by the Microſcope, it appears a moſt elegant and inſtructive object; its green part is of a ſmooth, even and regular texture, compos'd of no ſeparately concreted Granulæ, but one equal homogene maſs, of a very pleaſing colour, and moderately pellucid; its white veins are of a fine ſnow white, and complex tabulated Spar, what white ſpots there are in it alſo are of the ſame ſtructure, and the black ones, tho' more confus'd, imperfect and mutilated, from a quantity of adventitious matter, which prevents their perfect and regular formation; yet if examin'd in different views, and in the various angles they naturally break into, will be found to be of the very ſame complex tabulated texture with the white; that is, the ſame with the Phengites Marble and fruſtuloſe Spars; the diſcovery of this, tho' it requir'd much application and accuracy, was of great ſatisfaction to me, in ſhewing, that nature is the ſame in all her works of the ſame kind, and that often the true texture of bodies is the ſame with what our obſervations of ſimilar ſubſtances wou'd lead us to conclude, tho' we cannot always ſee it; tho' the formation of theſe black ſpots was difficultly diſcernible, and ſcarce to be aſcertain'd in their complex maſſes; the examination of a part of the Marble, ſpeckled with the minute, and to the naked eye ſcarce diſcernible black ſpecks before deſcrib'd, made it moſt plain and evident; for here the Microſcope diſcover'd the whole gradation, from the ſimpleſt to us diſcernible particles, to the perfect complex fruſtulæ of this claſs of bodies: Theſe ſmall ſpots were here diſcover'd to be of different ſizes and degrees of complex concretion; the greater number are plain regular parallellopipeds, the true and certain figure of the pure concretions of this Spar; they appear a little tranſparent, and ſeem colour'd by metalline, not earthy matter, commonly ſome of them are a little mutilated, but in general they are more perfect than the concretions of Spar are commonly ſeen; many of theſe are ſeen in other places, forming little aſſemblages together, and ranging themſelves according to the laws of attraction and gravitation, into what can be the only figure, a complex body of them regularly arrang'd can make, that is a flat equal table, and in others two or three of theſe tables, ſettled evenly on one another, ſhew'd in little the ſtructure of the larger maſſes of theſe bodies,

dies, which form the ordinary black ſpots, and ſhew'd it to be that of the complex plated or fruſtuloſe Spar; this remarkable obſervation, added to thoſe on the Phengites, may, I promiſe myſelf, be ſufficient to evince that this is the natural, and the only natural general coaleſcence of the marbly Spar.

The antients had this in common uſe, it cut eaſily, and made without much trouble very beautiful veſſels for the table, *&c.* and the Germans uſe it for the ſame reaſon, on the ſame occaſions ſtill; the old authors commend it alſo againſt venemous bites; they have very well diſtinguiſh'd it from the other, or black Ophites, not by its white ſpots, for theſe were common to both, tho' more frequent, and more numerous in this, but by its ſoftneſs. Pliny expreſly ſays, *Mollius eſt & candidum*; and Dioſcorides, who does uſe the colour as his diſtinction, yet diſtinguiſhes it by that in ſome meaſure from the other, by obſerving, that it had its white in veins, not in ſpots; this indeed was no certain mark, becauſe both had it at times in both figures; but this is certain, that it is much more frequently found in veins in this.

It was had among the antients from Egypt, and ſome few places beſide; we find it in France, Italy and Germany; the German, however, is the leaſt valuable, becauſe its ground is often debas'd with a greyiſh or blackiſh tinge.

Sect. V. Grey Spotted MARBLE.

1. *Marmor cinereum, maculis, parvis nigris variegatum. Quod Tephria & Ophites cinereus Antiquorum.*

Aſh colour'd Marble, with ſmall black ſpots. The Tephria and grey ſerpentine of the Antients.

This is the Tephria, Plin. v. 2. p. 733. Ophites Cinereus Tephria vocatus Cæſalp. 92. Marmor Cinereum Tephria dictum, Aldrov. Muſ. Met. 752. Tephria Boet. 502.

It is a very fine, even and ſmooth Marble, of a moderately firm and compact texture, conſiderably heavy, and of a very lively and beautiful aſh colour'd grey, variegated with a multitude of black ſpots of irregular figures, but in general all much of the ſame ſize, and that not exceeding the ſixth part of an inch in length; they are generally leſs broad than long, and always lie in the ſtratum in a perpendicular direction. It is of a tolerably even ſurface when broken, and looks ſmooth, equal and deſtitute of brightneſs in the ground, and bright and glittering, and compos'd of ſmall Granulæ in the black ſpots. It is conſiderably hard, and takes an elegant poliſh. Water has no power to pervade its ſtructure.

It will not give fire with ſteel.

It ferments vehemently both in the grey and black parts with Aqua Fortis.

It burns to a mottled grey.

Examin'd by the Microſcope, the ground appears very ſmooth and equal in its texture, and of a beautiful very pale grey; the ſpots of a fine deep black, and all compos'd of cluſters of angular Granulæ, very cloſely and irregularly cluſter'd together; this may ſhew that the general coaleſcence in theſe ſpots, which are really ſo many naturally diſtinct and ſeparate nodules, was very ſudden, but happen'd not till after they were ſunk into the grey maſs; for they all ſhew proofs of having been ſoft at their firſt immerſion in it, by their oblong figure, and perpendicular direction.

The antients had this with their Baſaltes from Æthiopia; Egypt alſo afforded it, and does to this day; it is frequently found in ſtrata, and ſometimes in looſe maſſes. In Germany they have much of it, but it is inferior to the oriental in purity and hardneſs; the ground is often very foul and irregular, and the ſpots ſometimes very large; theſe accidental variations, however, are too ſmall while the ground remains conſtantly grey, and the ſpots only black, to lead any into the error of imagining it a new ſpecies.

The antients were no leſs fond of this than of the two other Ophitæ, for its virtues againſt the bites of venomous animals, and many of them thought this the very beſt kind. In many parts of the world it is ſtill worn as an Amulet, and much eſteem'd on ſuch occaſions.

2. *Marmor cinereo-fuſcum, maculis læte virentibus variegatum.*
Greyiſh-brown Marble, with bright green ſpots.

This is a very beautiful Marble, of a very fine ſmooth and even texture, conſiderably firm and compact, very heavy, and of a deep duſky aſh colour'd brown, with beautiful ſpots of a lively green, always ſmall, and generally of an oblong figure. It breaks with a ſmooth even ſurface, and is gloſſy, but not glittering in any of its parts, both the ſpots and ground ſeeming of a ſmooth equal ſtructure, and affording no diſtinction of Granulæ. It is of very great hardneſs, and takes an excellent poliſh. Water does not at all enter its texture.

It will not give fire with ſteel.

It ferments briſkly with Aqua Fortis, eſpecially in its green parts.

It burns to a pale mottled grey.

Examin'd by the Microſcope, it appears in the ground a marbly Spar, loaded with adventitious particles, and by them render'd almoſt opake; the ſpots are of a lively and elegant green, very pellucid, and appear like ſo many emeralds when view'd ſeparately and diſtinctly. Aqua Fortis diſſolves theſe almoſt entirely; the ground it works leſs ſtrongly upon, and leaves more than half of it untouched, after ever ſo many repeated affuſions. The green ſpots of this Marble ſeem to have been form'd firſt, and even perfectly harden'd, before they ſubſided into the maſs, for they lie in all directions in it, have evidently not at all alter'd their figures ſince long'd there, and cohere leſs firmly with the maſs than the ſpots of any of the other Ophitæ.

It is frequent in Egypt and Arabia, and is ſaid to have been dug in England; it is deſcrib'd by Dr. Harley in the Philoſ. Tranſactions, and mention'd by Dr. Woodward, Cat. Eng. Foſſ. V. I. P. 20.

3. *Marmor cinereum, maculis & venis virentibus variegatum.*
Pale grey Marble, with green ſpots and veins.

This is a very ſmooth, fine and even Marble, of an extreamly compact and firm texture, very heavy, and of a beautiful pale grey, in ſome places ſlightly ting'd with a very faint red, and in others approaching to whitiſhneſs; its ground has all theſe variegations in colour, ſometimes in the ſame, ſometimes in different blocks, and is variegated with a very beautiful pale green, diſpos'd with not much leſs variety, for it is ſometimes in ſmall oblong regular ſpots, and ſometimes in thin uneven veins; it is very ſmooth, even, and gloſſy, but not at all glittering where broke, and is very hard and capable of an extreamly beautiful poliſh. Water cannot at all pervade its pores.

It will not ſtrike fire with ſteel.

It ferments violent in Aqua Fortis.

It burns to a pale uniform whitiſh grey.

Examin'd by the Microſcope, it appears a very beautiful object, being conſiderably tranſparent in all parts, but moſt ſo in the green ſpots. Its ground is perfectly ſmooth, even and uniform; the ſpots not leſs ſo, and the veins ſometimes as even as theſe, and ſometimes concreted into ſmall angular Granulæ.

It is frequent in Germany, and is a very valuable Stone; it is ſometimes found in ſtrata ſometimes in looſe nodules; of the former of theſe they make tables, &c. and of the ſmaller baſons and ſmall veſſels, both extreamly beautiful: Dr. Woodward mentions a ſpecimen of this, found on the ſea ſhores in Cornwall.

SECT. VI. Red, vein'd and variegated MARBLES.

1. *Marmor rubrum venis, albentibus & aureis variegatum. Quod Brocatello Italorum, & Marmor Thebaicum Antiquorum.* *White and Gold vein'd red Marble. The Brocatello of the Italians, and Theban Marble of the Antients.*

This is a very well known Marble at preſent, and was equally ſo to the Antients; they, from the place, have almoſt univerſally call'd it, the Theban Marble, and we, from the Italians, have learnt to call it, Brocatello, from its ſtrong and lively colours, reſembling thoſe of a ſcarlet, and gold or ſcarlet and ſilver brocade; it is the Marmor Thebaicum, Plin. v. 2. p. 734. the Theban Marble of Theophraſtus, ed. noſt. p. 21. the Marmor Thebaicum, Aldr. Muſ. Met. 452. Cæſalp. 94. Boet. de Boot. 506. and the Brocatello of our artificers; for tho' the Italians reſtrain this name to ſuch of it as is only red and yellow, we extended it to that which is red and white.

It is a very elegant and beautiful Marble, of a ſmooth, even, and regular texture in its red part, but ſomewhat obſcurely granulated in its white and yellow, of a cloſe, compact, and tolerably firm texture, conſiderably heavy, and of a fine, clear, and bright red, variegated in ſome places with only white, in others with only yellow, and in many with a beautiful intermixture of both; it is perfectly deſtitute of brightneſs in its red parts, but ſomewhat glittering where freſh broken in the white and yellow veins; theſe are very large and broad in ſome places, very narrow, and finely interſpers'd in others, and generally make up nearly half the maſs; the whole has a very gay appearance, is moderately hard, and takes a very fine poliſh: water does not at all enter its pores.

It will not ſtrike fire with ſteel.

It ferments very violently with Aqua Fortis.

It burns to a mottled reddiſh brown.

Examin'd by the Microſcope, it affords a very pleaſing object; the red part is very opake, loaded with adventitious Earth, and being by that prevented from forming into regular concretions, makes one irregular and earthy looking maſs; the yellow veins are regularly made up of a congeries of angular, but often mutilated concretions, and the yellow approach to the ſtructure of the Phengites, only the fruſtulæ are much ſmaller; the various matters that conſtitute this Marble ſeem to have ſubſided together while very ſoft, and tho' not ſufficiently ſo to become abſolutely blended into one maſs, yet to have found nothing to prevent their diffuſing themſelves with all freedom and making that beautiful irregularity always viſible in the variegations of it.

It is found in Egypt, where the antients ſo long ſince knew of it, and in many other places; Italy abounds with it; in England we have ſome quarries of it towards Devonſhire; and in Germany it is very common: The Ægyptian is ever much the fineſt of all theſe, and the Engliſh the worſt; the Italian is principally red and yellow, and approaches much to the Theban, which is ſtill found as Pliny has deſcrib'd it, with its yellow variegations, very ſmall, and in form of little ſpots, *Aureis guttis interſtinctum*; the Italian has the yellow in larger blotches, and the Engliſh which has but little, and ſometimes no yellow at all, wou'd not at firſt view be taken for the ſame ſubſtance. And this is not peculiar to this Marble, we have here quarries of many other of the Marbles, as I have already obſerv'd, which are ſuppoſed by moſt authors to be very ſcarce, common with us; often indeed, theſe, as in this inſtance, are leſs beautiful, but a judicious eye will diſcover them, and experiment will always confirm their anſwering alike to the characters of the ſpecies.

SERIES I.

CLASS II. ORDER III. GENUS II.

ALABASTRITÆ.

Stones compos'd of large ſeparate concretions, of great brightneſs, and an elegant, but ſhattery ſtructure; not very hard, not giving fire with ſteel, fermenting with, and ſoluble in Acids, and calcining in a ſlight fire.

1. *Alabaſtrites nivea, ſplendidiſſima, fruſtuloſa. Quæ Marmor Lygdinum Antiquorum.*

Snow white, ſhattery, lucid Alabaſter. The Lygdine Marble of the Antients.

THIS is one of the many valuable ſubſtances, which, tho' perfectly known, and much us'd by the Antients, the later writers have been wholly unacquainted with, notwithſtanding alſo that it is yet to be had in plenty.

It is the Marmor Lygdinum, Plin. V. 2. P. 734. Lapis Lygdinus. Salm. in Solin. P. 394. Marmor Lygdinum, Cæſalp. de Met. 89. the λυγδος λιθος of Heſychius, and λυγδος of Arrian, and probably, tho' that cannot certainly be determined, the Chernites, or Chermites of the antient Greeks, χερνιτης, Theoph. Ed. Noſtr. 22.

It is a moſt beautiful and elegant Stone, of a whiteneſs greatly ſuperior both to the Parian Marble ſo fam'd of old, and to the Carrara Marble of the moderns, and in ſplendor infinitely ſurpaſſing all the Marble Claſs. It is of a looſe, rough and ſhattery texture, but moderately heavy; and compos'd of a multitude of broad, flat and large particles, of a very bright and perfectly white marbly Spar. It is always found perfectly pure, and is moderately hard in the maſs, but ſomewhat crumbly in ſmall pieces, it cuts very freely, and is capable of a very elegant poliſh. Water is in ſome degree able to pervade its pores.

It will not be made to ſtrike fire with ſteel.

It effervеſces violently with Aqua Fortis, and is abſolutely diſſolv'd by it.

And with a very ſlight degree of fire becomes a fine plaiſter.

Examin'd before the Microſcope, it appears a very beautiful object; it is not eaſy to conceive any thing ſo perfectly white and bright as its conſtituent particles; they are all equally and moderately tranſparent, and all flat, broad, of ſhattery ſurfaces, and ſomething of a talcy appearance, as thoſe of all the marbly Spars are, and are impacted firmly together in different directions, cohering wherever they touch.

There are immenſe ſtrata of this elegant Stone in Arabia, as alſo in Ægypt, and in many parts of Italy.

It ſeldom gets over to us, and if any of it does, it is what the more judicious workmen very properly term white Alabaſter; for in general all the white Marbles are indiſcriminately known by that Name.

It is a moſt beautiful Marble for the ſtatuaries works, but ſeldom is found in large maſſes, the ſtrata being from the nature of the Stone ſubject to very frequent perpendicular fiſſures; the Antients alſo give us this very account of it, and only mention it as having been us'd like the other Alabaſter for making boxes to contain precious unguents: Pliny having juſt before been deſcribing that Alabaſter; ſays, *Paulum diſtare ab eo in unguentorum fide multi exiſtiment Lygdinos in Paro repertos; amplitudine qua Lances craterаſque non excedant antea ex Arabia tantum, advehi ſolitos candoris eximii*; nothing can be more expreſs than his taking notice here of its remarkably elegant colour; ſome copies of Pliny, have inſtead of *in Paro repertos, in Taro*, but all antiquity is againſt this reading; and Diodorus, who moſt expreſly alſo aſcertains the colour of this elegant Stone, ſhews that it was from Paros, not ſome imaginary place of the other name, he expreſsly mentions an Arabian Stone of peculiar whiteneſs and ſplendor, and ſays, it was ſuperior to the Parian Lygdus, or Lygdinus Lapis of Paros; this ſerves alſo to confirm Pliny's account of the Lygdinus of the Antients having been originally from Arabia, and thus the Antients carefully attended to and read together, ever ſerve to elucidate and ſtrengthen one another; not as ſome have too boldly and haſtily aſſerted to confound and puzzle: Arrian alſo evidently confirms all this, for mentioning the merchandizes of Arabia, he ſay, ἐξάγεται δὲ ἐξ αὐτῆς ἐντόπια μὲν σμύρνα ἐκλεκτή, καὶ στακτὴ σμύρνεια, λύγδος, &c. Diodorus's Account is alſo ſo expreſs, that the learned reader will not be diſpleas'd with it, Διόπερ ſays that Hiſtorian, οὔτε ἡ Παρία Λύγδος, οὔτε ἄλλη θαυμαζομένη πέτρα τοῖς Ἀραβίοις λίθοις ἐξισωθῆναι δύναται, ὧν λαμπροτάτη μὲν η λευκοτης, βαρυταῖος δὲ ὁ σταθμός, ἡ δέ γε λειότης ὑπερβολὴν ἑτέροις οὐκ ἀπολειποῦσα. Some copies of Diodorus have it λίγδος, and others λίθος; but it is very evident λύγδος alone can be the true reading, ſince, as has been before obſerv'd, Pliny and Arrian both call theſe white ſhining Stones of Arabia, Lapis Lygdinus: It is no wonder, however, that a word ſhould be miſtaken and miſplaced, the origin and derivation of which has not a little puzzled the judicious, and may ſhew, that not only a knowledge of the language, but a knowledge of the ſubject alſo is neceſſary in order to form juſt criticiſms on the works of the Antients on Foſſils; there occuring no word in the Greek language from which Lygdinus could be deriv'd, but λύγδος, the ſand of the ſea ſhores, and this ſeeming to bear no ſort of analogy to this elegant Marble, many have been for ſuppoſing Lygdis, the name of ſome city now loſt, near which this Marble was originally found, as it was common with the Greeks to name things from their places; but antiquity will warrant no ſuch conjecture, and Paros is, except Arabia, the only place we hear of that produced it; it is neceſſary therefore to ſeek farther for the etymology of the word, and in ſtrictly examining, we ſhall find to be from this very λύγδος, Glarea, or Arena Littoralis, and to have been very aptly nam'd by the Antients: I have obſerv'd it as the principal and moſt obvious character of this body, that it is compos'd of a multitude of large irregular particles cloſely impacted together; and have found no epithet ſo oppoſite to its ſtructure, as that of fruſtuloſum, ſignifying a maſs compos'd of and readily ſeparable into fruſtulæ, little fragments of Stone; whoever will conſult the old Greeks, will find, that they expreſs'd by the word λυγδος, any ſhatter'd ſtony matter in form of ſand, and particularly that of the ſea ſhores; ſome kinds of which deſcrib'd among the Saburræ in this work, are no other than the very diſunited fruſtulæ of ſuch Marbles as this; and ſuppoſing them to have underſtood theſe as they might by this word λύγδος Arena Littoralis, by what word could they more properly expreſs this Marble, evidently compos'd of ſuch matter, the concreted particles of ſuch λυγδος, than by a derivative from it, which could be no other than what it is found to be, Marmor Lygdinum: I am ſo ſenſible of the elegance, propriety and expreſſneſs of this long miſunderſtood term of the Greeks, that I am ready to confeſs my own new epithet fruſtuloſum; by which I flatter myſelf that this and other Marbles of this texture are very happily expreſs'd, to be no other than a tranſlation of the λυγδινον of the Greeks.

As this elegant Stone may be had on enquiring after, I would fain recommend it to the ſtatuaries for the making, as the Antients did of it, vaſes and other ſuch ornamental furniture, which were never more eſteem'd or valued than in the preſent age.

2. *Alabaſtrites lucidiſſima, fruſtuloſa, albido-flaveſcens; Quæ Marmor Phengites Antiquorum.*

Bright, ſhattery, yellowiſh white Alabaſter; the Phengites of the Antients.

This is a very beautiful, glittering and valuable Marble of that kind, called by the Antients Alabaſtrites, from the name of a City in Ægypt, near which the fineſt of this kind hereafter to be deſcribed was found in the greateſt plenty. This is common in many parts of the world, tho' not eſteem'd or us'd now as heretofore.

It is the Marmor Phengites, Plin. 2. p. 752. Phengites Sal. in Solin. p. 184. Cæſalpin. p. 95. Boet, 490. & 520. and of other Authors.

It is a very beautiful but rude, irregular, ſhattery maſs, of a looſe and open texture, conſiderably heavy, and of a very agreeable pale yellowiſh white, or honey colour; the yellowneſs more intenſe in ſome places than in others, and ſometimes making an obſcure reſemblance of veins; it is the moſt looſe and ſhattery of all the Marbles, compos'd of a multitude of very large and broad flat fruſtulæ, or irregularly ſhaped pieces of a fine, yellowiſh, marbly Spar, they are all plated or compos'd of thin tables laid cloſe on one another, and are very irregularly and uncertainly crowded together; they are all very pure and fine, and make the whole maſs remarkably bright and pellucid; it is but very weak and brittle in the maſs, and when reduced to ſmall pieces, eaſily crumbles between the fingers into looſe but conſiderably large angular pieces, ſome perfect, others complex, irregular and mutilated. Water poured on it ſlowly gets into its ſubſtance.

It will not ſtrike fire with ſteel.

It makes a very violent effervеſcence with Aqua Fortis.

It burns to a pure white.

Examin'd by the Microſcope, it appears a very amazing and moſt beautiful object; its conſtituent matter is every where ſeen thrown into attempts toward parallellopiped forms, ſome of them more, ſome leſs perfect, theſe are very firmly and evenly impacted together, and form a ſecondary concrete of a flat figure; a number of theſe, it may every where be obſerved, naturally falling cloſely and evenly on one another, from what might be call'd third concretes of flat plated texture. The primary concretions are, as has been obſerv'd parallellopiped, and are as it were the Gritt or Granulæ of theſe; and theſe, which are the only to the naked eye diſcernable Gritt or conſtituent matter of the maſs, ſuffer a fourth concretion in the general coaleſcence of the maſs which is ſeen to have been effected evidently while the other concretions were in different ſtates of hardneſs, and to have affected them accordingly. A ſtrict and nice examination of this Marble, will perhaps give more light into that obtuſe problem, the original coaleſcence and production of Stones, than any thing that has been hitherto ſaid in regard to it; examining it therefore with this intent, and in the light I have before placed it in, we find, that in the univerſal fluid in which its conſtituent particles were once ſuſpended, their firſt concretion was into ſmall parallellopiped maſſes; theſe when half firm or harden'd, ſuffer'd from the laws hereafter to be enquired into, the ſame to which this firſt coaleſcence from looſe atoms was owing; a ſecond concretion or aggregation into ſuch maſſes, as a number of them placed regularly ſide by ſide could make, that is, flat plates with ſmooth ſides and regular angles; the original concretions are many of them mutilated; and wherever they are not arrang'd, as is ſometimes the caſe, perfectly evenly, their angles have always made their impreſſions on, and enter'd into the plains of the adjoining pieces; therefore this arrangement or ſecond aggregation was made before the firſt concretions were perfectly hard; the ſame cauſe that made the firſt concrete of this kind, (which was probably no another than the natural gravity of the particles) and the regular ſtate of the fluid, muſt neceſſarily occaſion more of them ſubſequent one to another, which muſt naturally ſubſide alſo, as their conſtituent concretions originally did, and fall upon one other, their natural ſmoothneſs would make them lie cloſe, and the time taken up in the formation, if longer than that neceſſary for the more perfect hardening of the before ſubſided maſs, and their being form'd of particles already in a great meaſure hardened, muſt prevent their cohering together with any degree of firmneſs, altho' they touch'd very equally, and this we find to be the caſe: Theſe aggregates of the primary concretion and ſubſequent arrangement now muſt have been compreſs'd, cruſh'd and forcibly crowded together on the general coaleſcence of the whole into a maſs, the laſt and final concretion in order to the formation of the Stone; and ſo we at this day find them alter'd from their natural horizontal ſituation, and forc'd uncertainly upon, againſt and among one another; and this is the occaſion of the irregularity of the ſurface of the ſtone wherever broken; and as we find the concretions all arrived by this time at different degrees of firmneſs, and probably very nearly at their perfect hardneſs; it is very plain that they could but very ſlightly cohere in the new contacts they were forc'd into by this new and laſt coaleſcence of the general maſs; and accordingly we find the Stone, looſe, friable and ſhattery in a great degree.

Theſe things conſider'd, may give great light into the formation of a great part of the foſſile kingdom, and it is happy that we had in this Stone an opportunity of thus viewing the order and progreſs in the operations of nature in its formation. The analogy of the cryſtallization of Salts in a former inſtance, greatly helped us in the attempting an explanation of the concretion of a Foſſil; here the Foſſil ſeems to repay the obligation, and give us hints for the underſtanding the cryſtallization of Salts better than we perhaps do at preſent. I call the parallellopiped Granulæ the primary concretion here, becauſe it is the primary of thoſe our ſenſes can judge of; but who can ſay how many arrangements of the corpuſcles of matter of which thoſe cubes are form'd, might be previous to their concretion in that figure.

The purſuing the analogy of the concretions of theſe two kinds of hard bodies, both evidently concreted from ſuſpenſion in a fluid, and tracing the firſt concretions and ſubſequent aggregations of both, is a ſubject of great uſe, and may open a way to ſcenes of yet unthought of knowledge.

The Antients were fond of this Marble in their publick buildings, and the temple of Fortune, built wholly with it, has been long famous; its great beauty is its tranſparence, from which alone this temple was perfectly light, (tho' built without a window) even when the doors were ſhut. It was antiently found in Cappadocia, and the ſpecimen I have been deſcribing is from that very place: brought me, with the oriental boles, and ſome other things, many years ſince, but it is far from being peculiar to that place: I have heard of it in Germany and France, and have very beautiful ſpecimens of it from Derbyſhire; it takes an excellent poliſh, and is very ornamental in fine works which do not require ſtrength.

3. *Alabaſtrites fruſtuloſa, variegata, flavo rubeſcens: Quæ Alabaſtrites Antiquorum.*

Yellow and reddiſh, variegated, ſhattery Alabaſter: The Alabaſter of the Antients.

This is one of the moſt beautiful Stones perhaps in the world, and tho' nothing is more common in uſe than its name Alabaſter, yet little is it, in general, imagin'd what it is. Our workmen call all the white Marbles by this name, and the common opinion of the world muſt make us want a new one for this.

It is the Ægyptian Alabaſter, Ἀλαβαστρίτης Αἰγύπτιος, Theophr. Ed. noſt. p. 22. Ἀλαβαστίτης ὁ καλούμενος ὄνυξ, Dioſcorid. Ἀλαβαστίτης, Galen. Onyx, quam aliqui lapidem Alabaſtriten vocant, Plin. v. 2. p. 734. Lapis Alabaſtrites vocatus Onyx Salmaſ. in Solin. 394. Lapis Alabaſtrites Iſidor. p. 68. Alabaſtrites maculis fluvium imitans Aldrov. Muſ. Met. 749. and the Alabaſtrites of all the more correct authors.

It is a very remarkably bright, glittering, and pellucid Marble, of an extreamly elegant, but rude and irregular ſhattery texture, very looſe and open in its conſtitution, but moderately heavy, and of a moſt agreeable mixture of colours; its ground is a fine, clear, pale yellow, between that of honey and amber, pellucid and bright as the Phengites, and of the ſame tabulated and ſhattery texture, but beautifully variegated with arch'd and undulated veins, ſome broader, and others narrower, and ſome of a pale reddiſh hue, others whitiſh, and others of a very agreeable pale brown; theſe are all of the ſame ſtructure with the yellow parts of the maſs, and of the ſame ſubſtance, only debas'd by an admixture of earth; the whole makes a very elegant, but ſoft and ſhattery maſs, and is capable of an extreamly fine poliſh, and has a ſingular brightneſs from within when neatly work'd. Its whole maſs is a congeries of plates of Spar, compos'd of large angular concretions, and eaſily reducible to them, by rubbing in ſmall pieces between the fingers; ſome of theſe are very fair and perfect, but the greater number irregular, complex, and mutilated, and in the veins almoſt all imperfect and irregular. Water pretty readily finds its way into the texture of this Stone.

It will not give fire with ſteel.

It ferments very violently with Aqua Fortis, and is almoſt entirely diſſolv'd by it.

It burns to an aſh colour, or pale grey.

Examin'd by the Microſcope, it gives the ſame appearance with the Phengites; its particles are larger than thoſe of that Marble, but all approaching to parallellopiped forms, and all form'd into flat plates, which are laid evenly and cloſely on one another;

another, and form the fruſtules or broad irregular pieces, that the naked eye ſees the maſs compos'd of; it is remarkable, that both to the Microſcope and to the unaſſiſted eye, the matter of the veins is leſs regularly concreted, as well as leſs pure and pellucid than the yellow part of the maſs. Its fermenting leſs violently with Acids, ſhews that it contains Earth in theſe places, and after their ſolution, a conſiderable quantity of Earth is left, tho' very little from the yellow part of the maſs. We ſee here therefore plainly, that Earth receiv'd into a ſparry maſs in its concretion, is able to render it opake, and prevent its concreting into regular figures, it making it in this inſtance a more opake, and leſs regularly concreted and tabulated maſs.

This elegant Marble is found to this Day, as it ſeems ever to have been in Ægypt, and the accounts of the antients have ſo perfectly aſcertain'd what it was, that one wou'd wonder there ſhou'd have been any errors about it; Pliny calls it, *Mellei coloris & in vertices maculoſi,* which is a very expreſſive deſcription of it, for its veins are remarkably ſo diſpos'd. And the name Onyx, or more diſtinctly Marmor Onychites, which is evidently a ſynonymous term for this Marble, tho' hitherto not perfectly underſtood, convey'd the ſame determinate idea of the ſubſtance. The antients, as early as the days of Theophraſtus, we find were well acquainted with the nature of the Onyx, and diſtinguiſh'd it from the Agates, by its apparent character, its tabulated Zones. This which has evidently Zones, reſembling thoſe of the Onyx, and which is the only Marble that has ſo, they call'd therefore Marmor Onychites; their ſimilar uſe in the boxes for preſerving precious ointments, confirm'd the uſe of this name for the Marble as well as the Gem, and it afterwards became call'd Onyx alone.

Its place is the ſame now that Theophraſtus gave it in his days, and Pliny confirms in his; many years ſince ſome blocks of it got into England, and I convinced their owner, that they were the true oriental Alabaſter; ſince that time, much of the very ſame ſubſtance has been found on the Earl of Egmont's eſtate in Cornwal, and ſome other parts of England. In blowing up lime ſtone rocks, they find whole caverns incruſted with this ſubſtance, as they alſo do in Derbyſhire, with a ſparry ſubſtance, which is the true Phengites; but theſe are both coarſer than the oriental, and of leſs value as only incruſtations here, whereas there are whole ſtrata of them there.

I have ſeen ſome very elegant vaſes of this Corniſh Alabaſter, and once the columns for a chimney, they were very brittle, but of great beauty; the antients us'd it in columns, and even in their pavements, the

Totaque effuſus in aula
Calcabatur Onyx, of Lucan,

Which has puzzled ſo many of his commentators, was ſaid of this, not of the Onyx Gem; and the ſame meaning had Martial in a parallel ſentence,

Calcatuſque tuo ſub pede lucet Onyx.

SERIES I.

CLASS II. ORDER III. GENUS III.

PORPHYRITÆ.

Stones of a plain uniform maſs, ſpotted with ſeperate concretions; of great hardneſs, giving fire with ſteel, not fermenting with Acids, and very ſlowly and difficultly calcining in a ſtrong fire.

1. *Porphyrites purpureus, duriſſimus, maculis pallidioribus & albentibus variegatum. Qui Porphyrites Antiquorum.*

Hard, purple Porphyry, variegated with pale red and white ſpots. The Porphyry of the Antients.

THIS is a ſubſtance well known, and has been highly eſteem'd in all the known ages of the world.

It is the Porphyrites, Plin. V. 2. p. 733. Salmaſ. in Solin. p. 848. Aldrov. Muſ. Met. 751. Marmor Porphyrites, Cæſalp. p. 94. Boet. 506. Charlt. Foſſ. 247. and the Porfido of the Italians. It has its name from the Greek πορφυρος, purpureus, as the only Marble properly of that colour. It is a moſt elegant maſs, of a texture leſs fine than many of the ordinary Marbles, and always breaks with a rough irregular ſurface; it of an extreamly firm and compact ſtructure, remarkably heavy, and of a fine ſtrong purple, variegated more or leſs with pale red and white, and with a ſmall number of little, and generally diſregarded flaky black ſpecks; its purple is of all degrees, from the claret colour to that of the violet, and its variegations are rarely diſpos'd in veins, but in looſe diſunited ſpots, ſometimes very ſmall, and at others running into large blotches; it is greatly ſuperior to the Marbles in hardneſs, approaching to the Gems in that quality, and is capable of a moſt elegant poliſh; it has but little brightneſs where broken, and ſeems in its diſtinct parts not compos'd of any ſmaller concretions, but one equal and uniform maſs. Water finds no entrance into its texture.

It freely and readily gives fire with ſteel, even more freely than the common Flint.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a pale mottled red.

Examin'd by the Microſcope, it affords a moſt pleaſing object; the purple ground, which to the naked eye appear'd one uniform dull ſubſtance, is now ſeen to be a fine lucid concretion of a thouſand infinitely ſmall and glittering oblong angular particles, all of a moſt beautiful glowing purple, and very beautifully reſembles the bright and ſmall Cryſtals, frequent in the narrow creviſes of hard Stones; the ſpots are of a whitiſh matter, of the ſame form with the particles of the red, but leſs lucid, and larger in ſize; they are ſo much mutilated in their concreting, and ſo cloſely impacted together, that their figures are ſcarce diſcernible, except in a few places, and the whole maſſes have more or leſs of a diluted purple generally diffus'd thro' them. The black are ſmall congeries of particles of the ſame form and figure with thoſe of the white, only more irregular, and diſpos'd in ſomething of a tabulated form.

It is very evident, that the ſeveral ſmall maſſes which form the ſpots and variegations in this Marble, were diſtinct and ſeperate concretions, of a matter much the ſame with that of the general maſs, only different in colour, that the purple matter firſt ſubſided, and remain'd unharden'd, or at the utmoſt in the conſiſtence of a ſoft mud, at the time of the formation of theſe maſſes, whoſe own weight precipitated them as ſoon as form'd, into it, when the general coaleſcence and hardening coming on ſoon after bound all into one firm maſs.

It is found in immenſe ſtrata in Ægypt to this day, and was had thence we find in very early times, many of the nobleſt ornaments of antient Rome were of it; and Pliny expreſly aſſures us, that they were all brought from Ægypt. We have it now diſcover'd, however, in many other places, and according to the different degree of tinge in its purple part, and different ſize and diſpoſition of its ſpots, diſtinguiſh'd into different imaginary ſpecies, by late authors. So early as in Pliny's time this error of making new ſpecies from accidental varieties began in regard to this Foſſil; he tells us, that one kind of it variegated with ſmall white ſpots, was call'd the Porphyrites Leucoſtictos; or as Father Harduin wou'd have it, Leptopſephos. We have one about Piſa, whoſe blotches are larger and broader than ordinary, call'd Porphyrites Piſanum; and another frequently with no variegations at all, call'd from its country Porfidum Liguriæ Porfido de Liguria, by the Italians; but as I have obſerv'd on another occaſion, if we wou'd make new ſpecies from the various and accidental diſpoſition of the veins in Marble, we muſt have as many almoſt as we ſee blocks. I have ever accounted the Marble the ſame ſpecies, when its conſtituent matter is the ſame both in the veins and maſs, and can make no doubt of determining every one of theſe to be the ſame ſpecies, the purple Porphyry of the Antients, ſince all are of the ſame colours, without addition; all will ſtrike fire with ſteel, all refuſe to ferment with, or be diſſolv'd by Acids, and all anſwer to the ſame characters in the general deſcription; the ſpotleſs Porphyry of Liguria, in ſome meaſure proves the truth of my ſyſtem, in regard to the formation of the Claſs; ſince it is plain thence, that the purple baſis, and the ſpots, are two diſtinct bodies, and the matter of the maſs can become Porphyry without the latter.

Father Harduin is ſtrongly of opinion from ſome old Manuſcripts, that the word uſually printed Leucoſtictos, ſhould be printed Leptopſephos, λεπτοψηφος, from its being found in the form of ſmall pebbles, not in ſtrata. It is very certain that many of the Marbles are frequently found ſo, theſe being originally fragments broken from off their ſtrata, and rounded by water from their lying on the ſea ſhores, or in the current of large rivers, and that many other Stones of the texture of Marbles have originally concreted in ſuch form, of all which hereafter; but notwithſtanding the authority of theſe Manuſcripts, I cannot think this learned editor juſtifiable for ſo harſhly cenſuring Salmaſius's underſtanding the word Leucoſtictos to have been the original reading, and to have been given as a name expreſſive of the ſmall ſpots, Puncta, as Pliny calls them, exactly expreſs'd by the στίγματα of the Greeks, and which that author gives as the diſtinguiſhing character of this ſpecies: If I may be allowed to judge between theſe two great men in this diſputed point, from the context, which is *Rubet Porphyrites in eadem Ægypto, ex eo candidis intervenientibus punctis Leucoſtictos, or Leptopſephos vocatur: quantis libet molibus cædendis ſufficiunt Lapidicinæ*, notwithſtanding that Father Harduin chooſes to underſtand the latter part of the ſentence, as applicable to the former ſpecies alone, and for which I (with whom the ipſe Dixit of no man will paſs current without ſufficient reaſon on its ſide) can ſee no warrant, ſhou'd infer, that the name Leptopſephos, or pebble ſhap'd, nay form'd in ſmall pebbles, as that word exactly expreſſes, cou'd have nothing to do in the name of a Marble, the quarries of which allowed cutting ever ſo large maſſes; and that conſequently, tho' a very old, this was a very erroneous reading. But that the word, as it uſually ſtands Leucoſtictos, λευκοστικτος, was evidently the original reading, as it is expreſſive of the character of this ſpecies, (if it may be ſo call'd) of the Stone, and even contain'd a ſhort deſcription of it, ſignifying, *albis punctis diſtinctum*, a Porphyry mark'd with ſmall white ſpots; this expreſly agrees with Pliny's own deſcription of this kind, in the immediately preceding words, and is not only agreeable to the common cuſtom of the Romans of forming their diſtinctive names of natural bodies from Greek adjectives; but, which is worthy obſervation, is form'd from the very adjective the Greeks always us'd on this occaſion; the common name of their Sapphire, by which they diſtinguiſh'd its being ſpotted with yellow, was χρυσοστιγής. Orpheus deſcribing a ſpotted Agate, calls it κατάστικτον, and Sophocles deſcribing a ſpotted deer, calls it στικτὸς ἔλαφος. On the whole, I think it cannot be doubted, but that the Romans wanting to diſtinguiſh a Marble, whoſe character was its being mark'd with ſmall white ſpots, and intending to do it by a Greek adjective, muſt have us'd this very word.

2. *Porphyrites duriſſimus, miniaceus, viridi, nigro, & albo variegatus. Hard, red-lead-colour'd Porphyry, variegated with black, white, and green.*

This is a moſt beautiful and valuable ſubſtance, tho' hitherto not known to the world; it has the hardneſs, and all the other characters of the Porphyry, and even greatly excels it in brightneſs, and in the beauty and variegation of its colours.

It is of a harſh, rough, and irregular texture, and breaks with a very uneven ſurface, and is remarkably heavy, and of a moſt beautiful variegation of colours; its ground is a fine bright red-lead-colour, or rather ſomething paler than that, but of various degrees in different parts of the ſtratum, and in many approaching to a fleſh colour, or to whiteneſs; this is beautifully vein'd with green, in very regular, and ſomewhat broad lines, as alſo with ſome very narrow, perfectly white ones, and with a multitude of ſmall black ſpecks; it is compos'd, in the red parts, of very large and bright Fruſtulæ, and in the green is a more equal and uniform maſs; the black ſpecks may be diſtinguiſh'd to be every where mix'd among, but no where embodied in the Fruſtulæ of the red part, and not to enter at all into the green veins, tho' theſe make up a conſiderable part of the maſs; the whole is of extream hardneſs, even greater than the oriental Porphyry, and capable of an extreamly bright and perfect poliſh. Water finds no admiſſion into its pores.

It eaſily and readily ſtrikes fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It burns to a paler colour.

Examin'd by the Microſcope, it affords a moſt pleaſing object; the red part, or ground is extreamly bright and beautiful, and of a texture abſolutely different from all the before deſcrib'd; it is compos'd of a number of large irregular maſſes of indeterminate figures, but wherever they are broken, of ſmooth, flat, and very gloſſy ſurfaces: Examin'd more ſtrictly, theſe are found to be compos'd of extreamly thin plates, which ſeem fiſſile ad infinitum, in this they appear abſolute talc, but they have withal a brightneſs, and water peculiar to the Cryſtal claſs, and are all over full of tranſverſe cracks; their extream hardneſs, their ſtriking fire with ſteel, and their refuſing to ferment with Aqua Fortis, are proofs that they are nothing of the nature of the tabulated Spars; and theſe negative proofs, with the general obſervation of nature in analogous things, will lead us to determine, that the Granulæ of this Marble are congeries of flakes of foliaceous Talc, whoſe pores and interſtices are all fill'd up with cryſtalline matter, the rigidity and inflexibility of Cryſtal makes the tranſverſe cracks in the plates, from their not being able to bend (from their wanting the elaſticity of pure Talc) in the original coaleſcence of the maſs; and their brightneſs and water ſpeak them alſo, in great part, truly cryſtalline, as their extream diviſibility, their calcining exactly as the foliaceous Talc; and their evident, tho' ſmall degree of flexibility, prove them, with equal certainty, talcy; and in this manner may examination and careful experiment, with the compariſon with the other natural ſubſtances, and their analogy to one another, I flatter myſelf diſcovers the origin and ſtructure of the moſt complex bodies in the mineral kingdom; the green veins of this Marble are of a very different ſtructure, they are compos'd of no viſible particles, but are one pure, ſmooth, and equal maſs, of an elegant colour, great tranſparency and brightneſs, and actually approach to the nature of the German and Bohemian emeralds; the white are of the ſame ſtructure, but that they want colour, and the black ſpots in many places are lodg'd between the Granulæ of the red, but never entering the purer texture of the green, are congeries of flaky particles not black to this view, but of a fine pellucid brown, and evidently compos'd of a mixture of cryſtal and black Talc; this is the ſtructure of this beautiful maſs, and the conſideration of it cannot but lead us to conclude, that its formation was from matter evidently of two different kinds ſubſiding at different intervals on one another, for the green is all diſpos'd in regular veins, which have been even horizontal ſubſidences in the ſtrata; this was one homogene maſs of cryſtalline matter debas'd by earthy, and probably alſo by mineral particles, ſinking in all its purity, the red an irregular congeries of cryſtalline and talcy matter, firſt form'd into ſeparate nodules in its containing fluid, and then ſubſiding together into a ſtratum.

This is found in great plenty in the Iſland of Minorca, and is extreamly worth importing, for it is greatly ſuperior to all the Italian Marbles; it would be tedious and expenſive in the working from its great hardneſs, but its beauty, ſtrength and high poliſh would make it worth the pains; it would alſo ſerve as the Porphyry for the Painters and Apothecaries to levigate their colours and teſtaceous and metalline powders on.

3. *Porphyrites duriſſimus, carneus, nigro viridi & albo variegatus.* *Hard, pale red Porphyry, variegated with black, white and green.*

This is one of the few ſubſtances which Dr. Woodward has diſtinguiſhed by a name in his catalogue of Foſſils; it is evidently his Marmor nitidiſſimum atro candido & viridi intus collucido inſigniter variegatum, Vol. 2. Foſſ. Exot. p. 4. tho' he ſeems to have nam'd it from one ſpecimen only, and that one in which the ground colour was wanting, or ſo pale as to appear whitiſh, which is a common caſe in this and ſome other of the red grounded Marbles; this is indeed ſubject to very many ſlight accidental variations, as I have before had occaſion to obſerve of many others, and it may not be improper to obſerve from hence, that deſcriptions founded on ſingle ſpecimens, as thoſe in the authors of ſeveral catalogues of Muſeums, &c. have generally been, muſt neceſſarily be very vague, uncertain and of little inſtruction; the obſervation of nature in theſe her little deviations from herſelf, are moſt neceſſary in accounts of this kind intended to be determinate and inſtructive; and however widely ſhe may ſeem to differ from herſelf in ſome ſpecimens of the ſame ſpecies of Stone; I can honeſtly give the young ſtudent the encouragement of telling him, that I never found yet any that might not by an accurate examination, according to the teſts and characters here aſſign'd to them, be readily and certainly referr'd to its original ſpecies; theſe teſts and general characters repeated with every ſpecies, I promiſe myſelf will not therefore appear tireſome to the judicious and ſcientifick reader, ſince on theſe alone the diſtinction and determination of the ſpecies depend, and without them we might in ſome caſes puzzle and confound ourſelves by bringing together the moſt diſtinct ſubſtances, and in many more erect new ſpecies out of number from the varieties of only one; nothing can give us a ſtronger inſtance of this than the Marble before us, which might from its diverſity of configuration in the ſpots and veins, or want of the ground colour, or perhaps ſome one of the others be diverſify'd, tho' all from the ſame block into many ſpecies, and confounded from the reſemblance it in ſome circumſtances bears to them with two or three of the before deſcrib'd Marbles; but when we find it hard as Porphyry, refuſing to ferment with or be diſſolv'd by acids, and ſtriking fire with ſteel; theſe characters with its certain colours variable only up to a certain degree, evidently brings all its varieties together, and as evidently diſtinguiſh them from all the Marbles.

It is a ſomewhat rude, coarſe and rough maſs, of an irregular but very compact and firm texture, conſiderably heavy, and of a pale fleſh colour, often approaching to white, variegated with black, green and white in large blotches, from half an inch to an inch broad, and ſometimes, tho' very ſeldom, diſpos'd in irregular veins; it breaks with a tolerably even ſurface, and appears in all its parts very lucid, but with a brightneſs rather gloſſy than glittering; it is of extream hardneſs, takes a high poliſh, and emulates all the qualities of the oriental Porphyry; the red, white and green parts of this elegant maſs, appear all tabulated, and greatly reſemble the foliaceous Talcs, but with an additional brightneſs and water, and the black are the ſame in all reſpects, but debas'd by a large admixture of earth; they are all evidently mixtures of cryſtalline and talcy matter, and differ only in regard to the earth that debaſes them; the green, which uſually have a fine metalline tinge like that of the Gems, are brighteſt of all and almoſt perfectly tranſparent, the white and fleſh-colour'd ſeem ſlightly debas'd with an argillaceous earth of thoſe colours, and the black ſo far debas'd by ſuch an admixture as to be evidently ſofter than any other part of the maſs; it is of a prodigious hardneſs; takes a fine poliſh, and is ſo highly tranſparent, eſpecially in the green parts, that one plainly ſees deep into its ſubſtance.

The Microſcope confirms the judgment of the unaſſiſted eye, and in the black ſpots ſhews very plainly the edges of the ſeveral plates if view'd in a right light and direction, the others are more cloſely joined, but theſe are diſtinguiſhable plain enough too to an accurate obſerver.

It is found in immenſe ſtrata in Arabia Petræa and in the Upper Ægypt, and in ſeparate nodules in many other parts of the world; theſe are frequent in Germany and Ireland, I have ſeen of them alſo on our own ſhores, and in ſome parts of Devonſhire far from the ſea.

SERIES I.

Class II. Order III. Genus IV.

GRANITÆ.

Stones compoſ'd of ſeparate and very large concretions, rudely compacted together, of great hardneſs, giving fire with ſteel, not fermenting with acids, and ſlowly and imperfectly calcinable in a great fire.

1. *Granita alba, duriſſima, nigro variegata; quæ incolis Cornubienſibus Moor-Stone.*

Hard, white Granite, with black Spots; commonly called Moor-Stone.

THIS is a very valuable Granite, tho' not commonly known or in uſe any where except in England, and is of ſo large and groſs a ſtructure, that it may ſerve to explain the formation of many other of the Granites; in which, tho' the ſame in all reſpects, the ſmallneſs of their conſtituent particles, may make it much leſs diſcernible. This is a rude, but beautiful congeries of very variouſly conſtructed and differently colour'd particles, not diffus'd among, or running into one another, but each pure and diſtinct, tho' firmly cohering to which ever of the others it comes in contact with; and forming in the whole, a very firm, and tho' rude yet beautifully variegated maſs.

It is extreamly coarſe, harſh and rough, of an uneven, but very firm and compact texture, conſiderably heavy, and of a mottled black and white colour; the greater quantity of its particles are of a pure marbly white and opake, and theſe are generally form'd into the largeſt congeries, and emulate a coarſe talcy or tabulated texture; among theſe there are a multitude perfectly tranſparent, and of a pure cryſtalline water and brightneſs; theſe are in general the ſmalleſt of all the particles, and among theſe are lodg'd in all directions very conſiderable quantities of differently colour'd, and conſtructed foliaceous Talcs; ſome of theſe are colourleſs and tranſparent; others of a fair white, and ſemi-opake; others of the colour of brown Cryſtal, and a vaſt number perfectly black; theſe are not leſs different in their order and diſpoſition, than in their colours; ſome of them interſect, and are divided by the other Granules; others lie parallel with, and ſome flatly and evenly upon them, and others are abſolutely immers'd in the very ſubſtance of the pure cryſtalline particles, and embedded in them, like flies in amber; ſome alſo are ſingle and thin plates, others maſſes of ſuch broad and large plates, laid ſingly on one another; and others congeries of multitudes of ſmall, glittering and ſeparate Micæ; more than an hundred of theſe ſometimes go to make up the breadth of one plate of the ſingle ones; the whole is extreamly bright and glittering, of a very great hardneſs, and capable of a tolerable poliſh. Water pour'd on it, ſlowly gets into the imperceptible cracks and creviſes, between many of the Granules, and by degrees ſoaks thro' it.

It very readily ſtrikes fire with ſteel.

It raiſes no effervеſcence with Aqua Fortis.

It ſuffers very little change in the fire.

Examin'd by the Microſcope, it appears a very ſingular maſs, and to a nice examination with the thus aſſiſted eye, plainly diſcovers all its ſtructure; the ſmaller, pellucid, bright, and clear particles, are nodules of pure, unmix'd Cryſtal, no way differing from the ordinary pebble Cryſtal, nor from the ſprig, otherwiſe than in form; the larger, white, and more opake maſſes of a tabulated ſtructure, are nothing of the nature of the tabulated Spars, for they ferment not at all with acids, nor will divide into, or can be ſeen compos'd of parallellopiped primary concretions, but are of a plain and even laminated texture, like that of the foliaceous Talcs, and like them may be parted, tho' with leſs eaſe, and not without breaking, into horizontal plates; a ſtrict analyſis and examination of theſe, ſhews them to be a mixture of pure Talc, true Cryſtal, and an earth not unlike the white boles or pipe clay; and the foliaceous flakes and ſpangles are pure genuine Talc, flexile, elaſtic, and endu'd with all their qualities in perfection, ſometimes form'd into ſingle, broad, and flat plates, and ſometimes made up of a multitude of Micæ, Cryſtal, dead Earth, and Talc, therefore are all the ſubſtances that enter the compoſition of this Granite; and there can be no wonder that it refuſes to ferment with acids, ſince all its conſtituent matter does the ſame; its particles ſeem not to have all coaleſced at the ſame time, ſince the black Talc bedded in the pure cryſtalline particles, ſpeaks that's having been fluid when the former was already coaleſced; their concretions muſt however have fallen nearly at the ſame time, ſince their firm, mutual coaleſcence into this ſolid maſs, can be owing only to their having ſubſided together while yet ſoft, and in a condition to cohere like the particles of melted metals, which will refuſe to do ſo when the abſence of what kept them ſoft or fluid has ſuffer'd them to acquire any degree of their natural hardneſs.

This is found in immenſe ſtrata in ſome parts of Ireland, but is diſregarded there, and never brought into uſe; it is found with us in Cornwall, Devonſhire, and the adjoining counties, and brought thence in great quantities to London; it never, that is yet known, conſtitutes a ſtratum in theſe places, but is found on the ſurface of the earth in immenſe maſſes: to ſeparate theſe into portable lumps, they make a hole with a wedge in the maſs, and ſurrounding this with an edge of clay, fill it up with water, and thus leave it; the next day they find the water all ſoak'd in, and then with a larger wedge driven into the ſame hole, they ſplit the maſs into a number of pieces, according to the direction of the ſeveral imperceptible cracks and creviſes into which the water had made its way.

It is much us'd in London for the ſteps of publick buildings, and on other occaſions where great ſtrength and hardneſs are requir'd.

2. *Granita rubra, duriſſima, nigro & albo variegata: Quæ Pyropæcilos Antiquorum; Syenites Plinii, & Granita orientalis recentiorum.*

Hard, red Granite, variegated with black and white: The Pyropæcilos of the Antients; the Syenites of Pliny; and the oriental Granite of the Moderns.

This is a Stone which, for its extream hardneſs and beauty, ever has been, and probably ever will be in the greateſt repute and honour.

It is the Syenites, Plin. v. 2. p. 735. Granitum rubrum Cæſalp. 94. Marmor Syenites Boet. 506. and the Granito roſſo of the modern Italians.

It is like the former, a rude, complex, irregular maſs, very coarſe, harſh, and rough, of a firm, and extreamly compact texture, and naturally breaking with a very rough ſurface; it is conſiderably heavy, and of a very beautiful pale red, variegated with white and black; the red parts are of a rude irregular texture, and Marbly look, the white, many of them, tabular, and very bright and pellucid; others of rough ſurfaces, and ſemi-opake, the former compos'd of a talcy, the latter of an earthy Cryſtal; the black are plainly foliaceous, and of a black cryſtalline Talc; and beſide theſe there are many ſpangles and flakes of both black and white unalter'd pure Talc; it is conſiderably bright and glittering in all its parts, of a very remarkable hardneſs, and capable of a moſt elegant high poliſh. Water does not pervade its ſtructure.

It pretty readily gives fire with ſteel.

It makes no effervеſcence with Aqua Fortis.

It burns to a paler colour.

Examin'd by the Microſcope, it appears in the red parts a fair Marbly cryſtalline matter, ting'd with a ſlight admixture of earth, that makes it ſomewhat more opake than it naturally would be, and of no certain or regular figure; in the white it is evidently a cryſtalline Talc, the ſame with the white in the former ſpecies; its black ſpecks are a mixture of cryſtal Talc and a black earth, thrown into a middle texture between the natural formation of the three ſeparate bodies, and made a very opake, irregular, and obſcurely laminated maſs; and the particles of unalter'd talc are moſt of them pellucid, but ſome white, ſilvery, and opake, as we render the foliaceous Talcs by calcination; the coaleſcence and formation of this is evidently the ſame with that of the former, and the talcy particles among the cryſtalline, give it a beauty ſcarce to be equal'd, when cut and poliſh'd.

It is common in Ægypt and Arabia, as alſo in many other parts of the world; I have ſeen of it in the weſt of England, very little inferior in beauty to the fineſt of the oriental, and of a degree of hardneſs very nearly equal to it; our dealers in Marble have of late diſcover'd this, and ſell many a table of it, both here and elſewhere, under the name of the oriental: The Antients call'd it Syenites, from its country, and Pyrropæcilus, πυρροποίκιλος, ſpotted with fire colour from the frequency of its red variegations: the antient Greeks often expreſs'd yellowiſh red, or flame colour, by πυῤῥὸς, and πυῤῥοκόμης, and πυῤῥότριχος ſignify'd with them always yellow hair'd; whence ſome have imagin'd their Granite had yellow ſpots; but the obeliſks of it mention'd by Pliny, and ſome of them yet remaining at Rome, have no ſuch colour; and Ariſtotle will often be found to uſe the word, as ſignifying red, or fire colour, as well as flame colour; the antient obeliſks, which were all erected in honour of the ſun, and had their ſhape and name from the Ægyptian name and figure of his rays, as Pliny expreſſly ſays, *Solis numini ſacratos, radiorum ejus argumentum in effigie eſt, & ita ſignificatur nomine Ægyptio*, were all made of this Granite, and all hewn in the quarries, and carry'd thence by ſea to Rome; the vulgar opinion of their being caſt out of various fragments of Marble, becauſe they appear compos'd of particles or granules of different colours, if it deſerve an anſwer, is evidently overthrown by the account given here of the ſtructure and formation of thoſe Granules, the leaſt and meaneſt of which no human art cou'd ever compoſe, nor fire leave in the ſtate we ſee them in.

3. *Granita duriſſima, rubro albeſcens, luteo & nigro variegata.*
Pale, whitiſh-red Granite, variegated with black and yellow.

This is a maſs ſometimes found in ſtrata, but more frequently in looſe nodules, as many of the former ſpecies at times alſo are, and is very little inferior in beauty to the oriental Granite; it is very harſh, rough, and ſharp, but of a leſs coarſe texture than either of the precedent, conſiderably heavy, of a beautiful variegation of colours, red, black, white, and yellow, very bright and glittering when freſh broken, and capable of an elegant poliſh; its red and white parts are of an irregular rude texture, and ſeem cryſtalline, with a ſmall admixture of earth, but without Talc; its black pure Talc, without any either cryſtalline or earthy admixture, and are all laid in, in thin flat pieces, and the yellow ſeems a cryſtal greatly debas'd with a yellow earth: it admits water into a number of narrow and imperceptible creviſes, and is by that means eaſily ſplit.

It ſtrikes fire pretty readily with ſteel.

It does not at all effervesce with Aqua Fortis.

It burns to a more dull and opake maſs, but without much change of colour.

Examin'd by the Microſcope, it appears in many parts of a plainly laminated ſtructure; its red and white Granules are mere maſſes of pebble Cryſtal, a little debas'd by earth; and its black Talc the moſt perfect, bright, and beautiful imaginable; among theſe are many particles of an opake and ſilvery white, very like ſuch Talc as we have calcin'd; and the yellow parts all rude maſſes of Cryſtal, debas'd into a more opake body than Spar, by a great quantity of a yellow ochreous clay intimately blended with it.

There are immenſe ſtrata of this in the iſland of Minorca, from whence it might be had for uſe, and would make excellent tables, chimney pieces, and other ornamental things; in detach'd nodules of two or three foot circumference, the ſame ſubſtance is alſo frequent on the ſhores of the iſland of Guernſey, and is brought thence as ballaſt in ſhips, and us'd in the pavement of our ſtreets.

FOSSILS

NATURALLY and eſſentially compound, not inflammable, nor ſoluble in water.

Series the ſecond.

Thoſe form'd in detach'd maſſes, of a regular ſtructure, and determinate figure.

Of this Series there are two Claſſes.

The firſt of thoſe found in detach'd maſſes, divided by thin Septa or partitions, into various portions. The SEPTARIÆ.

The ſecond of thoſe form'd by repeated incruſtations of earthy and ferrugineous matter. The SIDEROCHITA, *or* CRUSTATED FERRUGINEOUS BODIES.

Series the ſecond.

Claſs the firſt.

SEPTARIÆ.

Foſſils of a moderately firm texture, and duſky hue, divided by ſepta, and compos'd of a ſparry matter, debas'd by earth; not giving fire with ſteel, fermenting with Acids, and in great part diſſolv'd by them, and calcining in a moderately ſtrong fire.

Of this Claſs there are two Orders, and under thoſe ſix Genera.

SEPTARIÆ.

Order the firſt.

Thoſe which are uſually found in large maſſes, of a ſimple uniform conſtruction, but divided by large Septæ, either into larger and more irregular portions, or into ſmaller and more equal ones, called Tali.

Order the ſecond.

Septariæ uſually found in ſmaller maſſes, of a cruſtated ſtructure, form'd by various incruſtations round a central nucleus, and divided by very thin Septa.

SEPTARIÆ.

Order the firſt.

Genus 1. SECOMIÆ. *Septariæ divided by Septa of Spar.*

Genus 2. GAIOPHRAGMIA. *Septariæ divided by Septa of earthy matter.*

Genus 3. PYRITERCIA. *Septariæ divided by Septa of Pyrites.*

Genus 4. DIAUGOPHRAGMIA. *Septariæ divided by Septa of Spar, containing an admixture of Cryſtal.*

SEPTARIÆ.

Order the ſecond.

Genus 1. Brachypyrenia. *Cruſtated Septariæ, with a ſhort roundiſh nucleus, encloſ'd within the body of the maſs.*

Genus 2. Macropyrenia. *Cruſtated Septariæ, with a long nucleus ſtanding out at each end of the maſs.*

SERIES II.

Class I. Order I. Genus I.

SECOMIÆ.

SEPTARIÆ divided by ſparry partitions.

The Foſſils of this and the two following Genera, have been hitherto known by the erroneous, or little expreſſive names of Ludus Helmontii in Latin, and in Engliſh, the waxen vein.

Paracelſus who had the cubic Pyritæ hereafter to be deſcrib'd, in great eſteem for diſſolving the ſtone, call'd thoſe bodies, from their reſembling a die in ſhape, by the general name Ludus; and Van Helmont afterwards miſtaking the bodies here deſcrib'd, for thoſe Ludus's of Paracelſus, gave them in the ſame caſes, and call'd them by the ſame name; hence the Latin name of Ludus Helmontii. The Engliſh one is acquir'd from the reſemblance of the Tali in ſome ſpecies; but of the Septa in many more to yellow wax in colour.

Sect. I. The Whitiſh SECOMIÆ.

1. *Secomia fuſca, externe cinerea, ſeptis albido ſtramineis.*
Brown Secomia, externally grey, with yellowiſh white partitions.

THIS is the ſpecies deſcrib'd, tho' not accurately by Dr. Woodward, Vol. 2. p. 8. of his foreign Foſſils, and by moſt eſteem'd the true Ludus of Van Helmont; but from the ſon of that gentleman's bringing both this ſpecies, and a duſky brown one, hereafter to be deſcribed into England, under the name of his Father's Ludus, as mentioned by Dr. Woodward in the ſame page; it ſhou'd ſeem that he eſteem'd the difference of the colour trifling, and us'd indifferently all the ſpecies that came to hand, knowing them as we do by the ſame general name.

This is a very firm maſs, of a cloſe, compact and even texture, of a ſmooth and equal ſurface, and of various ſizes, but in general of between ſix and twelve inches in diameter, commonly of ſome rude tendency to roundneſs; and ſeldom much flatted. Its colour ſeems a pale grey or aſh colour, ſince not only on its ſurface, but wherever it naturally flies aſunder in the breaking it, ſhews only that colour; this determin'd Dr. Woodward to call it grey; but on a cloſer examination, and the breaking it forcibly in different directions, we find that it is truly of a very fair pale brown, and only has a thin grey coat on all the ſurfaces it naturally ſhews; the true account of which is this, that beſide the cracks hereafter to be deſcrib'd, the filling up of which has made the Septa of theſe bodies in general; this ſpecies has always a multitude of imperceptible flaws, like thoſe common in flints, which tho' not diſtinguiſhable to the eye, ever determine the Stone to break in them. This body, in like manner, always naturally breaks at theſe flaws; and they being always lin'd on both ſides, with an extreamly thin cruſt of a grey clay; wherever the Stone falls aſunder at theſe natural creviſes, it ſhews this colour; it was an eaſy miſtake therefore to imagine this its true colour, tho' any one of theſe pieces broken acroſs, or in any place where there are none of theſe flaws, ſhews its true colour to be a pale brown, and only inveſted with the thinneſt coat imaginable of grey. Beſide theſe narrow cracks, the Stone has evidently been once ſubject to many wide ones; theſe being now fill'd up with a pure Spar, make what we call the Septa. Theſe are of a very beautiful pale yellowiſh white, conſiderably pellucid, and of an obſcurely ſtriated texture: They are ever thickeſt in the center of the Stone, and become thinner and narrower; that is, the cracks they have fill'd become ſmaller, as they approach the ſurface of the Stone: It is very plain that the matter of theſe has found its way thro' the pores of the Stone, ſince they are all double, compos'd of two plates, each adhering firmly to its ſide of the crack, and meeting in the middle. Theſe appear conſiderably bright where freſh broken, and where they have room, beſide filling their crack, frequently riſe into botryoide tubera, and efflorеſcences; the Septa in all theſe bodies, are, when of this ſparry matter, much of the ſame hardneſs, and of the ſame weight with pure Spar. The ſtony matter in this ſpecies is conſiderably heavy, moderately hard, and capable of a ſlight poliſh. Water does not at all pervade its ſtructure, if left on it for many hours.

It will not ſtrike fire with ſteel.

It ferments violently with Aqua Fortis, and is in part diſſolv'd by it; but this ſolution and fermentation are different, in different ſpecimens of the ſame Stone, and even in the different parts of the ſame ſpecimen; this, however, is always in proportion to the number and breadth of the Septa, where they are moſt numerous and thickeſt; the matter of the Stone ever ferments leaſt, and loſes leaſt of its weight by the Acid; where they are feweſt or thinneſt it ferments the moſt ſtrongly, and loſes moſt of its ſubſtance. The Septa themſelves in this, and all the other ſpecies, unleſs where accidentally foul'd, are totally ſoluble in Aqua Fortis, and make a violent effervеſcence with it.

In the fire the Stone acquires a whiter colour, and the Septa readily calcine to a pure whiteneſs. The ſtony matter of this ſpecies is not divided into regular Tali, but the Septa run in irregular lines and veins.

Examin'd by the Microſcope, the ſtony matter appears an opake maſs, of a ſomewhat looſe and ſpungy texture, and evidently compos'd of a fine pale clay, with a great admixture of a cryſtalline Spar; this is every where diſcoverable in the admixture, and frequently is ſeen looſe in ſmall lucid ſpecks, and plated fragments, looking like ſo many ſpangles of a foliaceous Talc; the Clay and Spar are in different proportions in the different ſpecies, but the Spar is in all the band of union, as itſelf is alſo in many Stones, and Cryſtal in many others; this appears very plainly in the effect of Aqua Fortis on the whole, for tho' the Spar only is affected and taken up by this Menſtruum, yet the clay can no longer hold together without it, but is found at the bottom in form of a looſe powder. The Septa, examin'd by good glaſſes ſhew their ſtriated texture, to be no other than the reſult of their being compos'd of a multitude of ſhoots of a pyramidal columnar Spar, trigonal at the head, and theſe if compar'd with the larger yellowiſh Spars, common in the fiſſures of free ſtone, and hereafter to be deſcrib'd, will be found to be the very ſame ſubſtance, differing only in the ſize of the ſhoots; they are like that, a pure Spar, of a whitiſh yellow, complex, and irregularly tabulated at the baſis, and form'd into regular trigonal ſhoots at the top; they are compos'd of almoſt as pure a Spar as can be any where found, and are perfectly pellucid, and of a fine brightneſs and water; the tubera and efflorеſcences are yet more perfect in figure than the plain parts; they are generally roundiſh, of various ſizes, of the ſame irregular complex texture within, as the Septa towards their roots, but at their tops are always found ſhot into the moſt perfect and beautiful trigonal figures; this is owing to their having had ſufficient room to ſhoot: They in the Septa generally cruſhing one another at their commiſſures. The Septa in this ſpecies are never affix'd to the brown matter of the Stone, but have always a plate of this grey Clay between, which is generally more loaded with Spar than the brown, and ſeems to have been the firſt ſubſtance waſh'd into all the cracks.

This is the moſt common ſpecies of this body in Germany, the Chymiſts and Apothecaries, who ſtill uſe it there in nephritick caſes, always choſe this, eſteeming it that kind Helmont moſt frequently us'd; and on many enquiries I cannot learn that a Ludus grey throughout, as Woodward deſcribes that given by Sir Iſaac Newton, from the younger Helmont, was ever found there; it abounds in the Banks of rivers in Germany,

many, and in England is very common; the ſpecimens I have from Antwerp are undiſtinguiſhable from thoſe of our own clay pits in which it lies very frequently and at all depths; it is ſometimes, but not frequently, cover'd with a cruſt of its own brown ſubſtance, but without any thing grey, and without ſepta or cracks; I have often found it containing Shells, and nodules of Pyritæ, and frequently mark'd with beautiful delineations of ſhrubs, plants and moſſes, the Dendrites of foſſile writers, in the commiſſures of its narrow cracks, in the clay pits near Gray's-Inn Lane.

From the careful examination of this body, it appears very plainly, that as the Jaſpers, Pebbles, &c. are compos'd of Cryſtal debas'd by an admixture of earth; theſe bodies are of Spar debas'd by a like admixture; we ſhall eaſily therefore come at the hiſtory of their origin and formation, if we conſider only the eaſe with which Spar ſeems in the bowels of the earth to be diſſolved and ſuſpended in, and again deſerted by water; a maſs of Spar debas'd by a large admixture of clay, concreting in the once univerſal fluid into a large looſe nodule, would as it dry'd ſhrink into a ſmaller compaſs; its parts recede from one another, and form a multitude of cracks wider at the centre, narrower toward the circumference; theſe we ſometimes find empty, ſometimes fill'd with earthy or mineral matters, the reaſons of all which will be hereafter aſſigned, but moſt frequently, indeed almoſt always with this pure Spar; this is not brought from elſewhere by the water, but only diſlodg'd from among the adjoining parts of the Stone, and brought to cryſtallize again, exactly as in the ſides of the perpendicular fiſſures of the ſtrata of Stone. That this is the caſe is plain from many things, but from none ſo clearly as this, that the more Spar there is found in the form of Septa in any part of the Stone, the leſs is found embodied in the Stone about that part, and vice verſa, the moſt where the Septa are feweſt; the fermentation and ſolution by Aqua Fortis plainly evince this, and are an experiment ſo eaſily made, that no proof can be more plain or obvious.

2. *Secomia duriſſima, fuſca, Septis paucioribus.*
Hard, brown Secomia, with fewer Septa.

This in ſome degree approaches to the former in colour, but that it wants its grey cruſts. It is nearly the hardeſt and moſt ſtony of all the bodies of this Genus. It is of an extreamly cloſe, compact and firm texture, of a rude, irregular and rugged ſurface, of various ſizes, from four to twelve inches in diameter, and very uncertain in ſhape, ſeldom at all flatted, often ſomewhat inclining to round, and very frequently of a long cylindric figure; it is commonly found naked and without a cruſt, but when it has one, it is ever of its own ſubſtance, and ſeems no other than a freſh application of more of the ſame matter round a maſs before pretty much harden'd. It is of a ſomewhat, but not much deeper brown than the former, of a much more compact ſtructure, and if attentively view'd, diſcovers the Spar it is compos'd of, in ſmall ſhining ſpecks, even to the naked eye. It has very few, and thoſe very ſmall and ſlender Septa, running to no great lengths, and is not at all divided into Tali by them, but only has them in form of narrow lucid veins; and many ſpecimens of it, particularly the cylindric ones, are frequently found abſolutely without any. The matter of the Septa is the ſame with thoſe of the former, but of a paler, or more whitiſh colour, of the ſame appearance both to the naked eye and to the Microſcope, and anſwers to the ſame teſts in the ſame manner; the Stone itſelf is much heavier than the former, particularly hard, and capable of a tolerable poliſh. Water does not at all find paſſage into it.

It will not give fire with ſteel.

It ferments very violently with Aqua Fortis, and is in great part diſſolv'd by it.

It burns to a greyiſh white.

Examin'd by the Microſcope, it appears of a ſomewhat irregular and ſpungy ſtructure, but very bright and glittering, and is evidently compos'd of a fine Spar, debas'd with a much ſmaller quantity of earth than the former.

As general ſyſtems, when founded on uncertain or falſe baſes, meet with an endleſs ſeries of thwarting accidents in the enquiries into the nature of the particulars included under them, ſo when juſtly founded, every ſuch enquiry muſt be found to ſtrengthen them; this ſpecies carries much weight for ſtrengthening the account of the origin and nature of theſe bodies, deliver'd in the former page, for being compos'd of a leſs debas'd Spar, it is naturally of a cloſer texture and union, and ſubject to fewer cracks and fewer Septa being conſequently form'd in it, its texture is therefore more pure, leſs porous, and from the ſame cauſe the matter of its Spar not being carry'd off to fill cracks and make Septa, each particle of the Stone contains more of it, ferments more violently with the acid, and loſes more of its weight in the ſolution; that is, a greater part of its ſubſtance is taken up by the menſtruum.

It is common in the clay pits between London and Iſlington.

3. *Secomia durior, fuſco-nigreſcens, ſeptis exalbidis.*
Hard, blackiſh-brown Secomia, with whitiſh partitions.

This is a coarſer, and leſs beautiful kind than either of the former; it is of a conſiderably compact, firm, and equal texture, it breaks with a rugged and uneven ſurface, is ſeldom of more than ſix or eight inches in diameter, and often not bigger than a hen's egg, and in ſhape generally approaching to roundneſs; it is always cover'd with a pale-brown cruſt of about one third of an inch thick, ſeldom more, and of the ſame compoſition with its internal part, only ſofter, and holding more clay; the Septa are very numerous, and ever of a pale, whitiſh Spar, of an obſcurely ſtriated texture; the matter of the Stone is of a duſky brown, variegated with black, but that in a very irregular and uncertain manner; ſometimes the blackneſs is perfectly deep and lodg'd in diſtinct ſpecks, much reſembling thoſe of the brown Lemnian earth; ſometimes it is diluted into a deep brown by admixture of the matter of the Stone, and variouſly mingled with it, but more frequently it is found ſpread over the ſides of the imperceptible creviſes of the Stone, and is ſeen, on breaking it, either like the grey clay in the firſt ſpecies, making a thin coat, and either ſpread over the whole crack, or in delineations in form of Dendritæ; the Septa are broad in this ſpecies, but do not divide it into any thing like regular Tali; it is conſiderably heavy, harder than moſt of the ſpecies, and capable of a tolerable poliſh; it is no unfrequent thing in this ſpecies to find many cracks quite empty, but this always when it has lain ſome time expos'd to the air, and as there are ever many Septa, even in the ſame maſſes perfectly form'd, and filling up other cracks, I am very apt to believe, that ſuch as we ſee empty, are only ſome of the naturally imperceptible ones, which on the Stones farther drying have gap'd and widen'd, and at which the maſs would in ſome farther time have fallen to pieces, as we ſee almoſt all the ſpecies frequently do when long expos'd; this, however, when it happens, does not fall out, either at the commiſſures of the Septa, or their fixing at their baſis to the Stone, but ever at theſe once imperceptible, and always empty cracks: water ſlowly pervades the ſtructure of this ſpecies.

It will not ſtrike fire with ſteel.

It efferveſces briſkly with Aqua Fortis, and is in conſiderable part diſſolv'd by it.

It burns to a pale reddiſh white.

Examin'd by the Microſcope, it appears of a very cloſe and even texture, leſs porous or ſpungy than moſt other ſpecies, and very bright and gloſſy, and is evidently compos'd of a ſparry matter, leſs debas'd by earth than moſt of the other kinds; the Septa afford much the ſame appearance with thoſe of the firſt ſpecies, but are leſs bright and gloſſy, of a more complex ſtructure, leſs regularly pointed, and almoſt abſolutely white.

It is found in moſt parts of the kingdom, and generally lies near the ſurface; in making the ditch banks between Pancras and London, there is generally a conſiderable quantity of it thrown up.

4. *Secomia durior, fuſco-flaveſcens, Septis albo-ſulphureis.*
Hard, browniſh-yellow Secomia, with yellowiſh-white partitions.

This is a very firm, hard, and ſtony ſpecies; it is of a ſmooth, equal, and very compact texture; it breaks with an equal and perfectly ſmooth and flinty ſurface; is of various ſizes, from four to twelve inches over, and generally of ſomething of a roundiſh figure, but always very much flatted and compreſs'd; it is generally cover'd with a thin deep-yellow cruſt, muſt ſofter than the ſubſtance of the Stone, and compos'd of a ſlight admixture of Spar, with a large quantity of an ochreous clay, and very liable to crack and crumble off when expos'd any time to the air; it has numerous Septa of a moderate breadth, running irregularly thro' its maſs, and meeting one another in different directions, but not dividing it into any regular Tali; theſe are of a pure, very pale yellow Spar, and appear ſtriated, as in the other ſpecies; the Stone is very heavy, of great hardneſs, and capable of a tolerable poliſh. Water does not at all pervade its ſtructure.

It will not give fire with ſteel.

It ferments very violently with Aqua Fortis, and is in great part diſſolv'd by it.

It calcines to a pure white.

Examin'd by the Microſcope, it appears of a moderately compact texture, and conſiderably bright and gloſſy; the Septa are of the ſame ſtructure with thoſe of the others, and from the parallel ſituation of the ſlender columns of the ſhoots of Spar they are compos'd of, appear of a ſomewhat rudely ſtriated texture.

It is common about London, and in the clay pits of moſt other parts of the kingdom, and generally lies near the ſurface.

5. *Secomia durior, griſeo-fuſca, Septis fuſcis.*
Hard, greyiſh-brown Secomia, with brown partitions.

This is a firm and durable ſpecies, of a very cloſe, compact, and equal texture; it breaks with a perfectly ſmooth and even ſurface; and is the largeſt of all the ſpecies of this Foſſil, being frequently found three or four foot over, of a perfectly irregular ſhape, but always appearing compreſs'd and flatted; it is never, that I have been able to obſerve, inveſted with any cruſt, it is of a colour compos'd of a ſeemingly equal admixture of brown and grey, of ſome little brightneſs, if attentively view'd where freſh broken, and vein'd with Septa of a fine deep brown, very bright and gloſſy, of the ſame obſcurely ſtriated ſtructure with the others, and with ſcarce any caſt of yellowneſs, but is not at all divided into Tali by them, the veins they make being but few in number, never very broad, and always ſcatter'd indiſcriminately thro' the maſſes; it is very heavy, remarkably hard, and capable of a tolerable poliſh. Water finds no paſſage into it.

It will not ſtrike fire with ſteel.

It ferments very violently with Aqua Fortis, and is in great part diſſolv'd by it.

It calcines to a greyiſh white.

Examin'd by the Microſcope, it appears of a very ſmooth and equal texture, but leſs gloſſy than many of the others; the Spar, tho' it contains leſs clay than in many of the other ſpecies, being more intimately mix'd with it, and having few or none of the ſhining ſpecks ſo common in many of the others; its Septa are very bright and elegant, they are of a fine tranſparency, very regularly trigonal at their points, but generally more confus'd in the diſpoſition of the columns than moſt others: This ſpecies furniſhes us with another inſtance of the various degrees and quantities in which Spar is mix'd with clay for the formation of theſe bodies, and that the fewer and ſmaller the Septa, the cloſer the texture of the maſs, and the greater its fermentation with acid menſtrua.

This is common in the tile clay pits about London, and elſewhere, and generally lies at conſiderable depths.

6. *Secomia duriſſima, fuſco-ferruginea, Septis fuſcis.*
Hard, ferrugineous-brown Secomia, with brown partitions.

This is a particularly firm and ſtrong kind, of an extreamly cloſe, compact, and regular texture, of a ſmooth and even ſurface, and in ſize remarkably large, many ſpecimens of it being found of two or three feet in diameter; it ſeldom has any tendency to roundneſs, but is generally broad and flat; it is ſeldom inveſted with a cruſt; when it is, 'tis generally of the ſame ſubſtance with the matter of the maſs, but of a ſomewhat paler colour; it breaks away in thin flakes, very irregularly and uncertainly, and if attentively view'd ſhews a great number of ſmall lucid ſpecks; its Septa are brown, of the ſame ſparry matter, and obſcurely ſtriated texture with thoſe of the other ſpecies, but they are few, and irregularly diſpers'd thro' the Stone, and do not divide it into any regular Tali; it is remarkably heavy, of great hardneſs, and capable of a very tolerable poliſh. Water does not at all enter its ſtructure.

It will not give fire with ſteel.

It makes a great effervefcence with Aqua Fortis, and is in great part diſſolv'd by it.

It burns to a browniſh red; the Septa as in all the other ſpecies, are totally ſoluble in Aqua Fortis, and calcine to a fine white.

Examin'd by the Microſcope, it appears of an extreamly cloſe, firm and even texture, ſomewhat bright thro' the whole, but ſpangled beſide with looſe ſpecks of ſparry matter in many places, which often reſemble Micæ of Talc; the Septa are of a complex columnar Spar, but rudely ſhot on the ſurface, and of a colour between that of the topaz and brown Cryſtal.

It is common on the ſhores of Yorkſhire, and is generally found in digging in that and the adjacent counties; I remember alſo I have ſeen much of it in Suſſex, and Mr. Da Coſta has of it from Mitcham in Surry.

7. *Secomia albida, friabilis, ſeptis luteo-fuſcis.*
Soft, whitiſh Secomia, with browniſh-yellow partitions.

This is the moſt ſoft, lax and crumbly of all the bodies of this Genus. It is of an open, looſe and friable texture, full of innumerable ſmall empty cracks, and ſomewhat porous, of a very rude and irregular ſurface; in ſize it ſeldom exceeds eight inches diameter, and has generally a rude tendency to roundneſs; it is ſometimes inveſted with a cruſt of the ſame ſubſtance with the matter of the maſs, but a little paler or whiter, and ſomewhat ſofter than it. It breaks very irregularly and uncertainly, and has but a rough ſurface where broken, and but a ſmall quantity of ſhining ſpecks. Its Septa are generally pretty numerous and thick; they are of a very elegant yellowiſh or reddiſh brown, of fine bright and pointed ſurfaces, and frequently rais'd into tubera, and efflorefcences, as the laxer texture of the maſs has given them room to ſhoot; they are, however, irregularly ſcatter'd thro' the maſs, and do not divide it into any regular Tali; it is much lighter than moſt of the Septariæ, and of no hardneſs, nor capable of any poliſh. Water pour'd on it ſoon pervades its ſtructure.

It will not ſtrike fire with ſteel.

It ferments very violently with Aqua Fortis.

It calcines to a pure white.

Examin'd by the Microſcope, it appears a looſe, duſty and ill-cohering maſs, and ſeems not compos'd as the others of Spar debas'd by Clay, but of the ſame Spar, with a large admixture of a white marly Earth. The Septa makes a very beautiful appearance; they are a browniſh yellow columnar Spar, with very complex baſes, but ſhooting at the top into very beautiful long pointed trigonal figures; the laxity of the maſs has ſuffer'd almoſt every part of the Septa to ſhoot thus, but the tubera and efflorefcences ſhew it with moſt elegance.

I have obſerv'd it in Northamptonſhire, Leiceſterſhire and Yorkſhire, and once found a few ſpecimens of it near Paddington. It generally lies near the ſurface, and is thrown up in digging for brick Clay.

8. *Secomia elegantiſſima, è flavo fuſca, cruſtata, Nucleo centrali ſubcæruleo.*
Elegant, cruſtrated Secomia, with a blueiſh Nucleus, and browniſh yellow cruſts.

This is a moſt beauiful and elegant ſpecies. It is of a very cloſe, even and compact texture, of a ſmooth and equal ſurface, generally of about eight or ten inches in diameter, and always of a roundiſh flatted ſhape. It is ever inveſted alſo with a cruſt which is of the ſame ſubſtance, only a little ſofter than the reſt, and of about one ſixth of an inch thick, and of a pale yellowiſh brown; the colour of the reſt of the maſs, except the nucleus, is alſo the ſame, but in different degrees of admixture. Its ſtructure, however, is perfectly ſingular, and very beautiful; it has a central nucleus uſually of four or five inches broad, and of about half an inch in diameter; this is of a pale blueiſh grey; and round this the matter of the nodule is diſpos'd in regular and orderly cruſts; they are all thinner or narrower as they approach the center, and broader as they go toward the ſurface, till that immediately within the cruſt is of a fingers breadth; they differ in colour alſo, generally, as they approach the ſurface or center; thoſe toward the center being commonly perfectly brown, and the others getting more and more yellowneſs intermixed, as they approach the ſurface. The Septa in this ſpecies are generally broad and large, but fewer in number; they are of a browniſh yellow, much like that of the ſtone, and appear of an obſcurely ſtriated texture; they are diſpos'd without the leaſt regularity in the maſs, and do not divide it into any thing like Tali. It is very heavy, and of great hardneſs, and capable of a very beautiful poliſh: Water does not at all pervade its ſtructure.

It will not give fire with ſteel.

It ferments very briſkly in all its parts with Aqua Fortis, not leſs in the nucleus than the reſt.

It burns to a pale red.

Examin'd by the Microſcope, it appears of a very even, cloſe texture, very full of Spar, and ſeemingly leſs debas'd by clay than moſt of the ſpecies; the whole ſubſtance has a good deal of brightneſs, and the Spar is diſcover'd in many places in looſe ſpecks and veins; the Spar which forms the Septa is generally ſeen ſhot into long columns, but the points are ſeldom very beautiful or regular.

It ſeems compos'd of a quantity of the ſame Spar, debas'd by various admixtures of different Earths, and form'd by the ſucceſſive and quick applications of freſh quantities of matter in form of cruſts to the nucleus, and to one another.

It is a very rare ſpecies, I have ſeen it only in two places, which were near Loughborough in Leiceſterſhire, and in a brick field near the New Croſs at Deptford; it lay in both places at a conſiderable depth, and in no great plenty.

9. *Secomia durior, ſordide-fuſca, ſeptis craſſiſſimis.*
Hard, duſky-brown Secomia, with very thick partitions.

This is a very beautiful, tho' deep and duſky colour'd maſs. It is of a very fine and ſmooth, and extreamly compact and cloſe texture, of an even and regular ſurface, and of various ſizes, but generally of between four and eight inches diameter; it has generally a rude tendency to roundneſs in figure, and is ſeldom at all flatted; it is generally cover'd with a pale yellowiſh brown cruſt, but ſometimes with one of its own colour, and ſometimes is found without any. It is of a very deep and duſky brown, approaching to what we call a chocolate colour, but without its purpliſh hue. It breaks with an irregular, but flinty looking ſurface, and has ſcarce any thing of the ſpangled look, viſible in many of the other ſpecies, if attentively view'd when freſh broken. The Septa are very numerous and very broad and thick; they are of a pale brown, with very little yellowneſs in it, tolerably pellucid, and of a more obſcurely ſtriated texture than in moſt of the other ſpecies; theſe, tho' they are very numerous, are yet ever diſorderly and irregularly diſpos'd, and do not divide the maſs into any regular Tali. It is very heavy, remarkably hard, and takes a very good poliſh. Water does not at all pervade its texture.

It will not give fire with ſteel.

It ferments more violently than almoſt any of the others with Aqua Fortis.

It burns to a paler brown.

Examin'd by the Microſcope, it appears of an extreamly cloſe, even and ſmooth texture, more gloſſy on the ſurface than moſt of the others, tho' without the ſpangles many of them have, and approaches to tranſparency at its edges. The Septa are compos'd of innumerable complex long columns, with very fair and regular trigonal points, and of a very pure, bright and pellucid Spar.

It is very common in the cliffs, and on the ſhores of Yorkſhire; I have alſo found of it about Deptford, and in the tile clay pit at Richmond: It frequently contains extraneous bodies, as do moſt of the other ſpecies at times; the ſpecimen I brought from Richmond of it, has a fine large Tellina immers'd in it, and is very luxuriant in the Spar, there being ſeveral very beautiful tubera about it, as there were alſo more or leſs on almoſt all I obſerv'd there.

10. *Secomia duriſſima, griſeo-fuſca Talata, ſeptis albidis craſſiſſimis.* *Hard, greyiſh-brown Secomia, divided into Tali, with thick whitiſh partitions.*

This is extreamly different from all the ſpecies before deſcrib'd, not only in the colour of its matter and Septa, but alſo in the diſpoſition of the Septa, which divide the whole into a number of irregularly ſhap'd ſmall Tali. It is of a ſmooth, even and very firm and compact texture, of a moſt irregular and rugged ſurface, in ſize generally of from four to eight inches diameter, and uſually has ſome rude tendency to roundneſs in figure. It is very rarely found inveſted with a cruſt, tho' I have ſometimes met with it cover'd with a very thick one of a pale browniſh yellow, filling up all the inequalities of the ſurface, and giving it a very ſmooth and equal one. Its colour is a pale greyiſh brown, and it breaks with an even ſurface, but has nothing of that ſparkling ſome of the other kinds have; a cloſe obſervation of all the ſpecies, I am perſwaded, will warrant this general obſervation, that the ſofter and more looſe kinds are the moſt ſpangl'd, the harder and more compact the leaſt ſo, not that theſe contain leſs Spar, but that the Spar is more equally mix'd with the Clay; this it is that gives them their hardneſs, and the others are ſofter, becauſe the Spar is more imperfectly mix'd; and in theſe it is continually found looſe in ſome parts, and in form of theſe ſpangles. The Septa in this ſpecies are very numerous, as alſo very large and thick; they are of a very pure whitiſh Spar, which ſhoots always into regular parallellopiped figures, and has a tabulated, not columnar baſis; ſo that it does not at all emulate the appearance of the ſtriated texture, ſo common in the reſt. This is not as in many of the other kinds, diſpos'd in a ſcattering manner in long diſtant lines, but every where running in various directions, by the frequent meetings of one plate with another, forms a kind of net work; the maſhes between which are fill'd up with the matter of the Stone, in form of Tali, or ſhort columns of various and uncertain irregularly angular figures, triangular, quadrangular, pentangular, but rarely more than hexangular; theſe are every where, except on the external ſurface, ſurrounded with the matter of the Septa, and ſometimes fall out and leave the cells empty; or as it ſometime is ſeen fill'd up afterwards with the ſame Spar that forms the Septa; the Tali are of various ſizes, from half an inch to an inch and a half in diameter; and the Septa where compos'd of a ſingle cruſt, as on the external ſurface of each outer talus, are of about one ſixth of an inch in diameter; and in the inner parts where they are double, they are often half an inch thick: The Stone is very heavy, of great hardneſs, and takes a fine poliſh. Water cannot at all pervade its ſtructure.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis, and is in great part diſſolv'd by it.

It burns to a reddiſh brown.

Examin'd by the Microſcope, it appears a fine, ſmooth and even maſs, of a gloſſy ſurface, ſomewhat tranſparent in thin pieces, of a fine pale grey, and very much emulates the appearance of the common coaſer flints. The Septa are no other than a very fine parallellopiped Spar; they are of the complex tabulated texture, deſcrib'd in the Phengites, of a fine pure white, very bright and tranſparent; and where they have room to ſhoot, every where regularly figur'd at their ſurfaces; a piece broken from theſe Septa, and view'd before the Microſcope, is the very ſame thing with a cluſter or nodule of the common white lead Spar to the naked eye, and indeed differs only from it in the ſize of its concretions.

It is not ſo common as many of the other kinds; I have found it at Deptford, in ſome parts of Yorkſhire, and near Loughborough in Leiceſterſhire; and Mr. Arderon of Norwich ſent of it ſometime ſince to Mr. Baker found near that place.

11. *Secomia talata, fuſca compreſſa, ſeptis flaveſcentibus.* *Brown, compreſs'd Secomia, with yellow partitions.*

This is one of the moſt elegant bodies of this Claſs. It is of a moderately cloſe, even and compact texture, of an uneven ſurface, generally of a very large ſize, from one to three feet in diameter; tho' there are pieces, and ſome of them I believe original nodules of only a few inches; in ſhape it is ever broad and flat; it is with all this breadth ſeldom more than four inches thick, and ſeldom manifeſts a tendency to any particular figure; it is ſometimes inveſted with a thin yellowiſh-brown cruſt, but much more frequently found naked in the Strata; it is of various degrees of brown, generally with ſome admixture of reddiſhneſs, but never, that I have yet obſerv'd, with the leaſt tendency to yellow; its reddiſh caſt makes it often very various in different ſpecimens, and ſometimes in the different parts of the ſame maſs; this tinge is owing to a ſlight admixture of iron, and tho' the natural colour of this ſpecies is a pure brown, I have ſeen it ſometimes brought up to a chocolate colour by this admixture; it breaks with a ſmooth and even ſurface, but ſhews no lucid ſpecks; the Septa are of a very beautiful honey colour, compos'd of a fine glittering Spar of a complex columnar texture, and ſhooting where free into trigonal points on the ſurface; it has, from the diſpoſition of theſe columns, the appearance of a ſtriated texture, and is moſt regularly and beautifully diſpos'd in the maſs ever going quite thro' it, and dividing it pretty regularly into a number of oblong angular Tali, of three, four, or more ſides, and of various diameters, from one to two inches, few being larger than this: the Septa are very regular in breadth, and make a very beautiful variegation on the ſurface of the Stone; the Tali are very heavy, conſiderably hard, and capable of an elegant poliſh. Water does not at all pervade its texture.

It will not ſtrike fire with ſteel.

It ferments very violently with Aqua Fortis, and is in great part diſſolv'd by it.

It burns to a duſky reddiſh brown.

Examin'd by the Microſcope, it appears of a fine ſmooth texture, moderately gloſſy, and ſomewhat tranſparent at the edges, and emulating the look of the coarſer flints; the Septa are a ſeries of regular columns crouded very cloſe together, and of a fine brightneſs and tranſparence.

It is common on the ſhores of Yorkſhire, Suſſex, and Kent, and is found lodg'd in the cliffs, and thrown up in the inland parts of the ſame counties in digging, but generally lies deep.

This ſeems the ſpecies deſcrib'd by Dr. Woodward, in his catalogue of Engliſh Foſſils, v. 1. p. 85. Sp. x. a. 1. and in three or four other places afterwards in ſmaller ſpecimens, and of a more or leſs purpliſh colour; I know no Genus indeed in which more care is requir'd, to diſtinguiſh between varieties and diſtinct ſpecies than this, nor any Foſſil which that Gentleman ſeems ſo little to have underſtood; he has not obſerv'd, that the plain reaſon why this, above all other bodies, is full of theſe ſparry Septa, is, that the very ſubſtance of the body itſelf is only a debas'd Spar; the Septa which are in moſt ſpecies of a columnar texture, appearing ſtriated on a curſory view, induc'd him to think they contain'd an admixture of Talc, whereas in reality what appears a little like Striæ, is only the common ſtrait direction and diſpoſition of the columns of Spar in their moſt natural ſtate, and is perfectly analogous to the larger maſſes we find of that Foſſil, incruſted in the very ſame manner on the ſides of the fiſſures of Stone, &c. and a few chymical experiments moſt evidently convince us, that this body can contain no Talc, ſince Talc is a ſubſtance not at all affected by Aqua Fortis, and theſe Septa are wholly ſoluble in it.

His arrangement of theſe bodies among the ſtriated Talcs, may be ſeen by this examination to be very faulty, but even if the Septa of theſe bodies were all pure Talc, ſurely it could not be proper to arrange the bodies which contain them under that claſs for that reaſon; it is true, that in this, and a few other of the ſpecies, the matter of the Septa takes up ſome room, and makes a figure in the maſs; yet even here in a greatly inferior quantity; but in moſt of theſe kinds, as it is only lodg'd in narrow diſtinct veins among the maſs, ſurely it muſt be more proper to call the bodies maſſes of ſtony matter, vein'd or divided by a Spar, than caſes of Spar containing Stone.

12. *Secomia albido-griſea, omnium duriſſima ſilicem emulans.*
Whitiſh grey, very hard Secomia, looking like flint.

This is a very ſingular ſpecies of this Foſſil, and greatly ſuperior to all the others in the firmneſs of its texture; it is of a very cloſe, compact, and even ſtructure, of a tolerably ſmooth and equal ſurface, of various ſizes, but ſeldom exceeding ſix inches in diameter, and in ſhape always either round or oval, never flatted, ſo far as I have yet obſerv'd; it is generally inveſted with a conſiderably thick yellowiſh-brown cruſt, of the texture and hardneſs of the maſſes of many of the ſpecies of this Foſſil; it is of a greyiſh white in different degrees, ſometimes very pale, and ſometimes with a greater or leſſer admixture of brown; it breaks with a perfectly ſmooth, polite, and flinty ſurface, but has no lucid ſpecks, as indeed is the caſe with moſt of the harder kinds; the Septa are very few, and very thinly and irregularly diſpers'd thro' it; they are of a very pale browniſh-white, and appear of a ſtriated texture; it is remarkably heavy, of great hardneſs, and capable of a very fine poliſh; its general appearance indeed is very much that of a Nucleus of mere flint, enclos'd in a cruſt of clay. Water does not at all penetrate its ſtructure.

It will not ſtrike fire with ſteel.

It ferments very violently with Aqua Fortis, and is almoſt entirely diſſolv'd by it.

It burns to a pale greyiſh white.

Examin'd by the Microſcope, it is of an extreamly pale colour, and in thin pieces, very bright and tranſparent; it is of a very cloſe and even ſtructure, and looks very like flint; the Septa are of a very pure columnar Spar, but the columns are ſhort, and their points irregular.

It is a very rare ſpecies: I remember to have ſeen it only in three places near Peterborough in Northamptonſhire, about two miles from Loughborough in Leiceſterſhire, and near Tyburn; in the laſt place there were laſt winter about ten or twelve nodules of it, lying in a kind of ſtratum at about twelve feet deep in a tile clay pit.

13. *Secomia ſubcærulea, extus pallide fuſca, Septis albidis.*
Blueiſh Secomia, brown on the outſide, with white Septa.

This is a very ſingular tho' not very beautiful ſpecies; it is of a moderately firm, compact, and cloſe texture, of a rugged and irregular ſurface, and of various ſizes, ſome ſpecimens being found of two foot in diameter, others only of a few inches, and in ſhape ever compreſs'd and flat; 'tis ſeldom of more than ſix inches thickneſs in the middle, from whence it ſometimes gradually becomes thinner to the edges every way, but oftener it maintains that thickneſs thro' the whole maſs; it very ſeldom emulates much of a round form, but is ofteneſt irregularly oblong; it is ſometimes inveſted with a cruſt of a pale brown earthy matter, with an admixture of a ſmall quantity of Spar, but is much oftener found wholly naked, and without any; its colour appears, to a ſlight obſervation, a very agreeable pale brown, and indeed wherever the Stone naturally and eaſily breaks, it conſtantly ſhews that colour; but if forcibly broken acroſs, or into ſeveral pieces, it will be found truly to be of a duſky blueiſh, or lead colour, and of a ſmooth equal ſurface, with a ſmaller number of the ſhining ſpangles, ſo common in theſe bodies than in moſt of the other kinds; the occaſion of its brown colour, wherever it naturally breaks, is the ſame with that of the like variegation in ſome other of the ſpecies, namely, that the maſs has, beſide the wide cracks which were the origin of its Septa, been ſhatter'd by a thouſand other inviſible ones, into which, however, the water continually pervading theſe, and almoſt all other bodies while in the earth, has carry'd the light and fine particles of this brown argillaceous earth, which have made extreamly thin but very perfect and regular coats over all the ſurfaces of them; the conſequence of theſe cracks is, that the Stone certainly breaks at them when ſtruck, and they exhibit every where ſurfaces cover'd with this brown clay and looking of this colour; the Septa in this ſpecies are of a very pure white, ſometimes, tho' but ſeldom, ſlightly ting'd with a brimſtone colour; they are very numerous, and moderately thick, and divide the maſs into a number of irregular Tali, of different number of ſides, and from one to three inches in diameter; the Septa in this, as in moſt other ſpecies, are thinner and narrower, as they approach toward the ſurface, and in ſuch ſpecimens of this, as are not inveſted with a cruſt, appear on the ſurface in form of thin white lines; the Stone is of a conſiderable weight, very hard, and capable of a good poliſh. Water pour'd on it finds no paſſage into it.

It will not give fire with ſteel,

It ferments violently with Aqua Fortis.

It burns to a pale duſky red.

Examin'd by the Microſcope, it appears of a moderately even ſurface and cloſe texture, ſomewhat bright throughout, a little tranſparent at the edges, and very little ſpangled with looſe Spar; the Septa are very elegant, they are commonly made up of two, but often of four rows or ranges of a columnar Spar, the ſhoots are all very evenly diſpos'd, and give the whole that reſemblance of tranſverſe ſtriæ, (which miſled Dr. Woodward into thinking theſe Septa really ſtriated, and therefore partly to conſiſt of Tali,) more beautifully than I think any other ſpecies has it.

It is a very ſcarce kind, I have ſeen it only twice, once at Loughborough in Leiceſterſhire many years ſince, the other time the winter before laſt in the tile clay pit at Richmond, ſo famous for having furniſhed Dr. Woodward with ſpecimens. That gentleman ſeems alſo to have met with this, and deſcrib'd it in his catalogue, v. 1. p. 90. Sp. xci. 30. but has not well expreſs'd the colour of the maſs; he calls it grey, and in drying it ever indeed acquires a much paler colour than it had while moiſt, and in the ſtratum, but has ever the blueiſh caſt of our common tile clay, of which mix'd in a large quantity with Spar it is unqueſtionably compos'd. The Dr. has obſerved, that in many of the maſſes of this body which he alſo had from Richmond, he found ſea ſhells immers'd, which I obſerv'd alſo very frequent there, both in this and all the other Septariæ, with no ſmall variety of which that fertile pit abounds.

SECT. II. (B) The Yellow SECOMIÆ.

1. *Secomia durior, pallide flaveſcens, ſeptis tenuibus raris.* *Hard, pale yellow Secomia, with few and thin partitions.*

This is often a very elegant maſs, the Septa tho' but few in number, being frequently diſpos'd with great regularity. It is moderately fine, and of a cloſe, compact and firm texture, of a rugged and unequal ſurface; very various in ſize, and often very large; I have ſeen of it of three foot in breadth, always of a flat, compreſs'd form, the thickeſt ſpecimens rarely exceeding two or at the utmoſt three inches, and it is ſcarce ever inveſted with any cruſt. It is of a very agreeable pale yellow, with ſome admixture of brown in it; it breaks with a very ſmooth and regular ſurface, and if carefully view'd will be found not to be without ſome lucid ſpangles in different places, and is frequently found coated over at the extremities with an extreamly thin ſhell, of a pale grey earthy matter; the Septa are very few, and very narrow, they are of a fine, pale brown Spar, diſpos'd in ſhort irregular columns, and emulating a ſort of ſtriated appearance; they are not ſo irregularly ſcatter'd thro' the maſs as thoſe in many other ſpecies, but generally lie in a ſtrait perpendicular Direction, and divide the maſs into a number of very large but not irregular Tali. There is often a firſt coat of a whitiſh ſparry earth on each ſide the cracks fill'd by theſe Septa, and for this reaſon the Spar which occupies the middle does not adhere ſo firmly to either ſide of the crack, as in many other inſtances, and hence the maſs is very apt to ſeperate into a ſort of Tali, or come to pieces at theſe commiſſures; this is the caſe in many other of the ſpecies alſo, and ever for this very reaſon, the intervention of a laxer matter between the Septum and matter of the maſs preventing the coherence of the different Tali, form'd by the original cracking of the maſs; and not ſuffering the ſparry partition to be, as it naturally is in other caſes, a band of union to the whole. It is moderately heavy, conſiderably hard and capable of a very tolerable poliſh. Water ſcarce at all enters its ſtructure.

It will not ſtrike fire with ſteel.

It ferments violently with Aqua Fortis.

It burns to a duſky red.

Examin'd by the Microſcope, it appears a Spar highly ſaturated with a yellowiſh clay in many places, equally mix'd and conſtituting a ſmooth, equal matter; in ſome others more irregularly blended, the earthy part being more diſtinguiſhable, the texture more rare and porous, and the Spar ſeen looſe in ſmall lucid ſpecks. The Septa are of a very bright, pellucid and beautiful Spar, compos'd of ſhort columns and of irregular ſurfaces.

It is found in many parts of the kingdom, Leiceſterſhire, Northamptonſhire, Warwickſhire, and ſeveral other counties afford it plentifully in the clay pits. I have alſo ſeen it near Highgate, lying at about eight foot deep, but the cliffs of the Yorkſhire and ſome other ſhores, are the places which afford it in greateſt abundance: there are maſſes of it of two or three feet broad, and very regularly divided, common there both lodg'd in the cliffs and looſe on the ſhores.

2. *Secomia mollior, ſordide flava, ſeptis craſſiſſimis.*
Softer, duſky yellow Secomia, with very thick partitions.

This is an irregular maſs and of but little beauty. It is of a tolerably ſmooth and even texture, but leſs firm and compact than many others, of an unequal, irregular ſurface, and very various in ſize, from two inches to two feet in diameter being the ſizes frequently met with; it is ever of a compreſs'd figure, and irregularly flat, but generally thickeſt toward the center, and going off into thinneſs toward the edges; this however is no certain form of the looſe ſpecimens, many of them being broken pieces of larger, and conſequently of uncertain figures. It is ſeldom inveſted with a cruſt, but when it is, always has it of its own ſubſtance, a little more ſoftened by a larger admixture of earth. It is of a diſagreeable and duſky yellow, with ſome admixture of brownneſs, and breaks generally in irregular flakes, and with a rough ſurface, and ſhews a few lucid ſpecks like ſmall ſpangles of Talc: The Septa are of a very fine pale yellow Spar, irregularly diſpers'd and in conſiderable number, they are of a very remarkable thickneſs, many of them not being leſs than one third of an inch in diameter; they are compos'd of a fine bright, and very pellucid Spar, form'd into regular and orderly ranges of columns, and having very much the appearance of a ſtriated body; the points where they have liberty to ſhoot, are all exactly trigonal, and very beautiful; the broader and thicker the Septa are, the longer muſt the columns of Spar naturally be which compoſe them, for they are all made up of two rows of theſe columns, one from each ſide meeting in the middle, and there ſhooting if they have room into their trigonal points, but in ſome of the very broad Septa in this ſpecies I have obſerv'd a double row of columns from each ſide, and the whole compos'd of four ranges of columns meeting in three commiſſures, beſide the joinings to the two ſurfaces of the cracks; the maſs is but moderately heavy, leſs hard than moſt of the other ſpecies, and ſcarce capable of any poliſh. Water ſlowly pervades its texture.

It will not give fire with ſteel.

It ferments more languidly than moſt of the other ſpecies with Aqua Fortis.

It burns to a duſky red.

Examin'd by the Microſcope, it appears of a more lax and ſpungy texture, and more debas'd with earth than moſt of the other ſpecies; what Spar it has is in moſt places pretty equally mix'd, but in ſome ſhews itſelf in looſe ſpecks; the Spar of the Septa is of a pale brown, and very bright and tranſparent.

It is common in the brick clay pits about Deptford, and in many other parts of the kingdom. It generally lies near the ſurface.

3. *Secomia dura, pulchre flaveſcens, fuſco variegata.*
Hard, bright yellow Secomia, variegated with brown.

This is a ſingular and very beautiful ſpecies. It is conſiderably fine, and of a moderately cloſe and compact texture, of a very rugged and unequal ſurface in ſize, generally between four and twelve inches in diameter, and ever of an oblong, flat form, not thicker in the middle than elſewhere, but equally ſo throughout, and generally of about two inches in thickneſs. It is commonly inveſted with a thick cruſt of its own ſubſtance, ſoftened by a larger admixture of earth, and is of a very bright and beautiful yellow, ſometimes coated with brown, at other times vein'd with it in different directions, and at others containing a large maſs of it as a central nucleus; this variegation is a pale greyiſh brown of the ſame ſubſtance and texture with the reſt, and differing only in colour; the whole breaks with a tolerably even ſurface, and ſhews ſome looſe particles of Spar in lucid ſpecks in different places. The Septa are very thin and few in number, irregularly diſpers'd thro' the ſubſtance of the maſs, and made up of a pale brown Spar in ſhort columns. It is of a moderate hardneſs, and capable of a ſlight poliſh; water very ſlowly finds its way into its ſtructure.

It will not give fire with ſteel.

It ferments briſkly with Aqua Fortis.

It burns to a pale red.

Examin'd by the Microſcope, it appears compos'd of a Spar moderately ſated with an argillaceous Earth, and both well blended together; the Spar of the Septa is ſomewhat duſky, and ſeldom well figur'd at the points.

It is frequent in the tile clay pits about Pancras.

4. *Secomia duriſſima, luteo, fuſca, undulata, ſeptis rariſſimis albidis. Very hard, browniſh yellow, undulated Secomia, with very few, and whitiſh partitions.*

This is alſo a ſpecies very ſingular in its figure and ſtructure; it is very fine and hard, of an extreamly cloſe, even and compact texture, of a ſmooth, even and regular ſurface, in ſize ſeldom large, moſt of the maſſes I have yet met with of it being of from three to nine inches broad. It is ever of a ſomewhat compreſs'd or flattiſh form, and is oftener ſquare or irregularly oblong, than of any tendency to a regularly round or oval figure. It is rarely inveſted with any cruſt, and when it is, but with a very thin one. It is of a browniſh yellow in colour, but not regularly or uniformly ſo, but is of an undulated ſtructure, and has the different colours in form of waves or clouds rolling upon and over one another. It breaks with a tolerably ſmooth and even ſurface, and is ſlightly ſpangled with looſe ſpecks of Spar. Its Septa are very ſmall, and very few, many of the larger maſſes being frequently found wholly without them; thoſe which have them, have but very few, and they are ever of an almoſt perfectly white, and very gloſſy Spar, of an apparently ſtriated texture. The maſs itſelf is very heavy, extreamly hard, and capable of a fine poliſh. Water finds no paſſage into its ſtructure.

It will not ſtrike fire with ſteel.

It ferments violently with Aqua Fortis.

It burns to a deep chocolate colour.

Examin'd by the Microſcope, it appears a very pure, regular and uniform maſs, of a ſmooth ſurface, and ſomewhat gloſſy; the looſe ſpecks of Spar in it are but few, but thoſe very bright. The Septa are ranges of ſhort columns of a very fine and pure Spar.

It is common on Mendip Hills in Somerſetſhire, and I do not recollect the having met with it in any other place. It generally lies deep.

5. *Secomia durior, talata griſea, ſub flava, ſeptis tenuioribus luteis. Hard, greyiſh-yellow Secomia, divided into Tali, by thin yellow partitions.*

This is a very elegant and beautiful maſs. It is of a very fine, cloſe and compact texture, of a moſt irregular and unequal ſurface; and in ſize very various and uncertain, nor leſs ſo in ſhape, there being frequently found maſſes of it from four to twelve inches broad, and much of it being rudely roundiſh maſſes, and much in flat compreſs'd tables; it is rarely inveſted with a cruſt, but when it has one, it is commonly of a pale yellow; its colour is a mixture of grey and yellow, ſometimes ſeparate, and in different parts of the Stone, but more generally blended one with another, and forming a very agreeable colour between them; it breaks with very ſmooth, even and polite ſurface, but has very few looſe ſpangles glittering among it. The Septa are of a fine pale honey colour; they are very thin and running among one another in great plenty, and in all directions form by their various joinings a kind of cellular or coarſe retricular work, ſomewhat in form of a honey-comb, but with larger cells; theſe are of various figures, and of a different number of ſides, and divide the maſs into a multitude of irregular Tali, commonly of about an inch in diameter each, and of three, four, five or ſix irregular and unequal ſides. The matter of the Septa is a fine pellucid Spar, in a double row of columns, with trigonal heads; the maſs is very heavy, conſiderably hard, and capable of a very good poliſh; and the variety of colours of the Septa and other ſubſtance, and the orderly diviſion of the whole into Tali, makes a very pretty figure. Water does not eaſily find admiſſion into its texture.

It will not give fire with ſteel.

It ferments violently with Aqua Fortis, and is in great part diſſolv'd by it.

It burns to a pale reddiſh grey.

Examin'd by the Microſcope, it appears a very compact and fine maſs, of a flinty look, and ſmooth, even and polite ſurface, the Septa are very elegant; they are very regularly columnar, and of finely cryſtaliz'd points, all exact and elegant trigonal ſhoots.

It is frequently met with, both looſe on the ſea ſhores, and lodg'd in the cliffs in Yorkſhire, and is thrown up in digging frequently on Mendip Hills; laſt winter I found alſo a few fine ſpecimens of it near Highgate, in the great tile clay pit.

SECT. III. Ferrugineous SECOMIÆ.

1. *Secomia flavo ferruginea, ſeptis tenuioribus ſtramineis, ſubrotunda.* *Round, yellowiſh, ferrugineous Secomia, with thin ſtraw colour'd partitions.*

This is a very beautiful ſpecies; it is very fine and ſmooth, of a cloſe, compact and even texture, of a tolerably equal ſurface, in ſize generally of about eight or ten inches in diameter, and ever in form of a pretty regularly round ball. It is always inveſted with a cruſt of a ſomewhat paler colour, and ſofter ſubſtance than the reſt, and generally of near an inch thick. Its colour is a very agreeable mixture of a ferrugineous ruſt colour, and a pale yellow; it breaks with a ſmooth even ſurface, and has a few lucid ſpecks of looſe Spar, like ſo many ſmall flakes of Talc. The Septa are of a very beautiful pale ſtraw colour, elegantly cryſtaliz'd at the commiſſures, and of a columnar ſhape, compos'd of a moſt pure and bright Spar; they are pretty numerous in the maſs, but not rang'd in any ſort of order, or dividing the maſs into any regular Tali, and are ever thickeſt in the center of the Stone, and thinner as they recede from it, very few of them reaching near the ſurface; beſide theſe, the maſs is ever divided by a multitude of other natural flaws, imperceptible to the eye when the Stone is firſt taken up out of the Earth, but if ſtruck, it always breaks at them; theſe, as the maſs dries, by being expos'd to the air, widen by degrees, till they become at length as broad as thoſe which being fill'd up with Spar now make the Septa, yet even theſe ſeldom reach to the cruſt, and never paſs it, or even go at all into it; theſe may ſerve as one great proof of the true origin of the Septa, and theſe had they widen'd at the time when the cracks which were the origin of the Septa did, they wou'd doubtleſs have been now fill'd up, and in the ſame form with the reſt. It is conſiderably heavy, moderately hard, and capable of a ſlight poliſh. Water cannot find way into its ſtructure.

It will not give fire with ſteel.

It ferments moderately with Aqua Fortis.

It burns to a duſky red.

Examin'd by the Microſcope, it appears a very even ſmooth ſubſtance, compos'd of a ſparry matter, debas'd by a large quantity of Earth, but ſo equally mix'd, that it makes a very uniform maſs, and has fewer coarſe parts, or looſe ſpecks of Spar than moſt of the other kinds. The Septa are of an elegant columnar Spar, ſhot into regular long trigonal points at the commiſſures, and of a fine brightneſs and tranſparency.

I firſt obſerv'd this on Mendip Hills, and in ſome other parts of Somerſetſhire, but ſince have found it very plentiful in the clay pits between London and Iſlington, where they dig clay for Brewers. It commonly lies at eight or ten foot deep.

2. *Secomia ferrugineo-rubra ſubrotunda, ſeptis paucioribus flavis.* *Roundiſh, ferrugineous-red Secomia, with yellow Septa.*

This in many things much approaches to the nature of the former ſpecies. It is of a very fine, cloſe and compact texture, of a ſmooth and equal ſurface, generally between ſix and twelve inches in diameter, and ever of a pretty regularly orbicular form. It is always inveſted with a thick cruſt, of a whitiſh brown argillaceous Earth, containing a good deal of Spar, and much approaching to the nature of the bodies of this Claſs; this cruſt is generally very evenly extended over it, and is commonly about half an inch thick; the maſs itſelf is of a mixture of ruſt colour and red, and makes no diſagreeable appearance; it breaks with an even ſurface, and has a ſmall number of ſhining ſpecks. The Septa are very ſparingly diſpers'd thro' the maſs; they are principally about the center, are but very thin, and loſe themſelves as they approach the ſurface; they are of a ſeeming ſtriated texture, and of a fine bright yellow. The Stone is very heavy, moderately hard, and capable of a tolerable poliſh. It will not admit water into its ſtructure.

It will not ſtrike fire with ſteel.

It ferments very briſkly with Aqua Fortis.

It burns to a deep chocolate colour.

Examin'd by the Microſcope, it appears a ſmooth, uniform, and ſomewhat gloſſy maſs: The Septa are of a very bright and pellucid Spar, ſhot into fine pointed columns.

It is very common in Somerſetſhire, Northamptonſhire and Yorkſhire, and is ſometimes found in the Iſlington clay pits.

3. *Secomia fuſco-ferruginea, ſeptis exalbidis.*
Ferrugineous-brown Septaria, with whitiſh partitions.

This is an unſightly and diſagreeable colour'd maſs. It is of a tolerably ſmooth and even texture, but much leſs compact and firm than many other ſpecies, of a ſmooth and equal ſurface, and in ſize very various, being from two to twenty inches over, but ever broad and flat. It is ſometimes found naked in the earth, but is generally inveſted with a thick whitiſh brown cruſt: Its colour is a ferrugineous or ruſty brown; it breaks with but an irregular ſurface, and ſhews many lucid ſpecks of looſe Spar. The Septa are of a very pure and elegant columnar Spar, emulating like the reſt the appearance of a ſtriated texture, from the parallel direction of the columns; theſe are generally neatly trigonal at the points, and the Septa form'd by them are commonly very regularly diſpos'd, paſſing the Stone in regular perpendicular directions all of them, and dividing its ſubſtance into a number of irregular Tali, or ſhort columns of different angles. The whole maſs is but moderately heavy, ſofter than the generality of the other ſpecies, and ſcarce capable of any poliſh. Water does not very readily get into its ſtructure.

It will not give fire with ſteel.

It ferments very briſkly with Aqua Fortis.

It burns to a duſky chocolate colour.

Examin'd by the Microſcope, it appears a ſomewhat coarſe and looſe maſs, of a ſpungy texture, very dull, and ſpangled with ſmall ſpecks of looſe Spar in many places; the Septa are very elegant, the columns which compoſe them are ſhort, very regularly laid together, and of a fine pellucid Spar; beſide theſe, it is very ſubject to empty cracks, which widen as it lies in the air, and at which, even while imperceptible, the Stone always breaks upon being ſtruck.

It is common on the ſhores of Yorkſhire, as alſo in the cliffs, and in digging in many other places; that found on the ſhores is always naked; that lodg'd in the earth generally has its cruſt; but as this is of a ſoft matter, 'tis no wonder that it ſhould be eaſily waſh'd off by the waves.

4. *Septaria duriſſima, ferrugineo-nigreſcens, cortice cruſtato flavo.*
Hard, blackiſh-brown Septaria, with a yellow cruſtated coat.

This is a very ſingular ſpecies. It is of an extreamly fine, ſmooth and compact texture, of a tolerably even and regular ſurface, and pretty regular in ſize, few maſſes of it being obſerv'd of more than ſix, or leſs than four inches in diameter, and all of an orbicular or oval figure. Its great ſingularity is the cruſt it is ever naturally encloſ'd in; this is abſolutely different from thoſe of all the other ſpecies, which are all of a ſofter matter, but of the ſame kind with that of the maſs, and all are full of ſpangles of looſe Spar, all are one ſingle ſubſtance, and all ferment with Aqua Fortis; this, on the contrary, is plainly of an ochreous clay, a ſubſtance perfectly different from that of the maſs; very ſoft, crumbly and friable, perfectly void of ſpangles, and indeed of Spar in any form, and not at all fermenting with Aqua Fortis. I have indeed found ſome exceptions from accidental changes in the bodies to its laſt rule; for in ſome ſpecimens, which have been by ſome means half decay'd, both the cruſt and the ſubſtance of the maſs, the Spar has been drain'd out of the maſs, and in part lodg'd among the cruſt;

this has then given a languid effervefcence with acid Menſtrua: but this is plainly an accidental change in the thing, and a great number of repeated tryals on the cruſts of this body, when in a more perfect ſtate, have convinc'd me, that naturally the cruſt contains no Spar at all, nor will ferment with any Acid. This coat, however, is not leſs remarkable in its ſtructure than ſubſtance; for whereas all the coats of the other Septariæ are one plain maſs, environing and cloſely annex'd to that body; this is compos'd of a vaſt number of extreamly thin cruſts, laid evenly and cloſely on one another, adhering but ſlightly to each other, ſo that they eaſily flake to pieces, and frequently ſtain'd with black within; theſe are of a fine deep yellow; they adhere as ſlightly to the maſs they cover as to one another, and eaſily break off from it with a ſmall blow; the coat they compoſe is generally of about one third of an inch in diameter, and I have often counted forty, or five and forty of them compoſing it, tho' often they are fewer: The body of the maſs is of a mixture of ruſt colour and black; it breaks with a very ſmooth and flinty looking ſurface, and has very few ſpangles of looſe Spar. The Septa are of the paleſt yellow of almoſt any ſpecies, but are ſomewhat debas'd in their colour by a ſlight admixture of a very pale brown; they are moderately thick, appear ſtriated acroſs as almoſt all the reſt do, and divide the whole into a number of irregular ſhap'd Tali, if they may be ſo call'd; for they are no way ſimilar to one another, nor of any regular ſize or ſhape, but merely the effect of a numerous ſet of diviſions. They are very heavy, extreamly hard, and capable of a fine poliſh. Water has no power to pervade its ſtructure.

It will not ſtrike fire with ſteel.

It ferments violently with Aqua Fortis, and is in a great meaſure diſſolv'd by it.

It burns to a deep chocolate colour.

Examin'd by the Microſcope, it appears of a very fine, even and cloſe texture, of a ſmooth and polite ſurface, tranſparent at the edges, or in very thin pieces, and of a deep duſky brown, with few or no looſe ſpangles of Spar. The Septa are of an obſcurely columnar ſtructure, the ſhoots very confuſedly join'd together, and the points but irregularly ſhot into their natural trigonal points. I have before obſerv'd, that the Spar from out the ſubſtance of the maſs, ſometimes finds its way in ſmall quantities into the cruſt: This, however, is but ſeldom the caſe, but it is much oftener that the matter of the cruſt finds its way into the Stone, and lodges itſelf in very thin coats over the ſurfaces of the cracks, which form the Septa, and between the Stone and the Spar; ſometimes alſo I have ſeen inſtances of its having been plainly taken up into the very ſubſtance of the Spar itſelf.

This is a very common ſpecies in many parts of the kingdom; I have obſerv'd vaſt quantities of it in Yorkſhire, in Northamptonſhire, in Staffordſhire, and on Mendip Hills, on the ſhores about Scarborough alſo, and ſome other places it is very common, but theſe aſſume a different face, and like many of the others in the ſame circumſtances, might be miſtaken for a new ſpecies. The cruſt is in theſe places ever worn off by the waves, and the ſubſtance of the maſs itſelf ſmooth'd and rounded in a particular manner, ſo as to reſemble a pebble; the lines form'd on the ſurface by the Septa, have in this caſe a very beautiful effect, but particularly where the maſs contains ſhells, as it ſometimes does, it appears quite a new Foſſil.

I never yet found it any where near London.

SERIES II.

CLASS I. ORDER I. GENUS II.

GAIOPHRAGMIA.

Septariæ divided by partitions of an earthy matter.

1. *Gaiophragmium fuſcum, durius, ſeptis terreis niveis.*
Hard, brown Gaiophragmium, with ſnow white earthy partitions.

This is a very elegant ſpecies; it is of a very cloſe, compact and firm texture, of a tolerably ſmooth and even ſurface, very various in ſize and ſhape, but moſt uſually of a roundiſh or oval figure, and of from three to twelve inches in diameter. It is ſometimes naked, but more uſually found in the ſtrata, inveſted with a thin whitiſh brown earthy cruſt. Its colour is a very pale and elegant brown: it breaks with a tolerably ſmooth ſurface, and has a conſiderable quantity of looſe Spar in form of ſhining ſpecks. Its Septa are very ſingular and beautiful; they are of a perfect ſnow white, extreamly ſoft and crumbly, apt to ſtain the hands, inſipid to the taſte, and are indeed form'd of a genuine white Marle; in ſome ſpecimens this matter alone makes the Septa, and in others it is join'd on each ſide to a thin plate of Spar; theſe Septa, where pure, and compos'd of the earth alone, are generally but thin; they are diſpos'd very variouſly and uncertainly in the maſs, and divide it into a number of very irregular Tali. The maſs is very heavy, conſiderably hard, and in itſelf capable of a very good poliſh; but wherever the Septa lie, there after the poliſhing remain ſo many empty cracks. Water does not at all pervade the ſtructure of it.

It will not give fire with ſteel.

It ferments briſkly with Aqua Fortis.

It burns to a pure white. The earthy matter of the Septa diffuſes readily in water, and hangs ſuſpended in it, making it white and milky, and ferments violently with Aqua Fortis.

Examin'd by the Microſcope, the ſtony matter appears a hard, compact and ſmooth maſs, the ſparry part of which is very perfectly in general united to the argillaceous; but what diſcovers the riſe and origin of theſe remarkable Septa is, that this compact Matter is every where as it were ſpotted with extreamly minute white ſpecks of a looſe texture, and perfectly opake, and appearing when cloſely examin'd of the very ſame ſubſtance with that of the Septa, both a true Marle, the very ſubſtance called by many Authors Lac Lunæ; and as the ſparry Septa in the other ſpecies are the ſame in all reſpects but ſize, with the Spar that often coats the perpendicular fiſſures of quarries of ſtone; ſo this is the very ſame ſubſtance with that Lac Lunæ which ſo frequently encruſts larger fiſſures, and is lodg'd here in the ſame manner, and by means of the ſame agent, water continually pervading both thoſe ſtrata and theſe nodules. It may not be amiſs here to remark, that it is not indifferently any ſpecies of Septaria which may be accidentally found with Septa of a marly, ochreous ferrugineous, or vitriolic matter, as inſtances of all theſe follow; but that each found ſo divided is determinately a diſtinct ſpecies, and indeed that no other but that ſpecies can be ſo: It wou'd be but a ſmall conformation of this to obſerve that among the great variety of theſe bodies I have ſeen, I have yet never met with any other than this ſpecies with Septa of this Marle, any but the following with thoſe of an ochreous matter, and ſo of the reſt; but if we conſider that according to the accounts here given of the origin of the Septa in theſe bodies, the matter they are form'd of is educ'd only from the ſubſtance of the maſs itſelf, and not brought as has been imagin'd from elſewhere, we ſhall eaſily ſee that no ſpecies can furniſh Septa of Marle, but that which has Marle in its own maſs, as we evidently ſee by the Microſcope, that this has; none ochreous ones, but ſuch as has Ochre; and ſo of the reſt.

This is a very ſcarce ſpecies; about twelve years ſince I remember to have found ſome of it near Bugden, once ſince that time on Mendip-Hills, and lately a few ſpecimens near London, in the tile clay pit near Tyburn road.

2. *Gaiophragmium durius, fuſco-ferrugineum, ſeptis ochreis flavicantibus. Hard, ferrugineous-brown Gaiophragmium, with yellow, ochreous partitions.*

This is but a duſky colour'd maſs, but is ſeldom without ſome accidental beauty, being more than all the other kinds apt to be mark'd with Dendritæ, or black delineations of trees and moſſes near the Septa, and on the ſides of a number of imperceptible cracks, at which it ever breaks when ſtruck. It is of a very firm, cloſe and compact texture, of a rugged, unequal ſurface, and very various in ſize and ſhape, but generally flattiſh, and of between four and ten inches broad. It is very ſeldom inveſted with a cruſt, but when it is, has it of a pale yellowiſh, ſoft ſubſtance; it is of a ruſt colour'd brown, generally ſpotted and clouded with black in many places, and often elegantly ſtain'd with it in the forms of ſhrubs, &c. like the delineations in the Agates, which we commonly call Mocoa ſtones. It breaks with a very ſmooth, even, regular ſurface, and has ſeldom any of the lucid ſpecks ſo common in many, eſpecially in the laxer ſpecies, from particles of looſe Spar: Its Septa are generally narrow, and but few in number, they are very uncertainly and irregularly ſcatter'd thro' the ſubſtance of the maſs; they are wholly compos'd of a mixture of an Ochreous and Marly earth, the firſt the great quantity, the latter only blended in ſmall proportion with it, and ſometimes almoſt abſolutely wanting: the Ochre is of a very deep ſaffron colour, the Marle of a greyiſh white, and they are ſometimes found perfectly blended with one another, and forming a very agreeable yellow maſs, ſometimes more imperfectly united, and diſtinguiſhable in diſtinct blotches; this earthy mix'd ſubſtance generally compoſes the Septa alone, but I have ſeen inſtances where, as ſometimes in the former, there have been ſome Septa form'd of a thin plate of a columnar Spar inclos'd between two of this: the maſs is never divided into any thing like regular Tali. It is conſiderably heavy, very hard and capable of a good poliſh; but like the former leaves the places of the Septa in empty cracks after poliſhing. Water pour'd on it does not at all ſink into it.

It will not give fire with ſteel.

It ferments pretty briſkly with Aqua Fortis.

It burns to a duſky browniſh red.

Examin'd by the Microſcope, the ſtony matter appears of a very compact and ſmooth texture, of a ſomewhat gloſſy ſurface, but with few looſe ſhining ſpecks. As in the former, the Marle which form'd the Septa, was more of it diſtinguiſhable in the body of the maſs, ſo in this is the ochreous matter, by the help of good glaſſes; it is, however, much more intimately mixt with the ſubſtance of the maſs, and ſeldom diſcoverable in diſtinct ſpecks. The Septa are of a looſe, rare, and ſomewhat ſpungy texture, commonly mottled with white and yellow, and when not ſo, that is, where the two ſubſtances which compoſe them are more equally mix'd, very much reſembling both in figure and colour, as well as their crumbly texture, the yellow Ochre known by the name of Giallolino, or Naples yellow, before deſcrib'd; theſe ferment but languidly, and in many places ſcarce at all with Aqua Fortis.

This is a rare ſpecies, I have ſeen it about Loughborough in Leiceſterſhire, in the neighbourhood of Northampton, and lately but in ſmall quantities in the great clay pit near Highgate; It lies there generally very deep, and in ſmall maſſes.

3. *Gaiophragmium pallide fuſcum, durius, ſeptis ferrugineis argillaceis.*

Hard, pale brown Gaiophragmium, with clayey ferrugineous partitions.

This is one of thoſe ſpecies of theſe Foſſils, very apt to miſlead a young ſtudent in regard to its colour, which is not to be diſcovered unleſs it be forcibly broken where there are no inviſible creviſes; for wherever there are of theſe, it breaks according to them, and ſhews not its own ſubſtance but a ferrugineous coat of the ſame ſubſtance and matter with its Septa. It is of a very cloſe, compact and firm texture, of a rugged and unequal ſurface; in ſize generally of between four and twelve inches diameter, and commonly of a roundiſh or oval form, tho' ſometimes broad, thin and flat; it is generally inveſted with a thin cruſt of its own colour, tho' ſometimes found without it; it is of a pale and pleaſant brown, breaks with a coarſe and unequal ſurface, and diſcovers many lucid ſparks of looſe Spar; the Septa are plainly of an argillaceous earth, ſtained with a plentiful admixture of particles of iron to a ruſt colour, and ſcatter'd irregularly, and in no great plenty thro' the ſubſtance of the maſs; beſides theſe, there are a number of imperceptible cracks, at which the Stone naturally ſeparates when ſtruck, and which widen by degrees when it has been ſometime expos'd to the air; all theſe are in the ſame manner lin'd with the matter of the Septa, and make the Stone wherever it breaks appear not of its own, but of their colour; it is not divided into any regular Tali; is very heavy, conſiderably hard, and capable of a tolerable poliſh: water ſlowly gets into its ſtructure.

It will not give fire with ſteel.

It ferments very briſkly with Aqua Fortis.

It burns to a duſky white.

Examin'd by the Microſcope, it appears of a moderately cloſe and equal texture, of a very dull ſurface, but ſpangled in a few places with looſe ſpecks of Spar, and evidently ſhewing the origin of its Septa by a plain admixture of the matter they are compos'd of, which is diſpos'd in form of blotches and ſmall irregular veins among the matter of the maſs; the Septa and coats of the cracks very languidly ferment with Aqua Fortis; I expected they would not at all have done ſo, but probably they are never perfectly free from Spar, but carry ſome, tho' in too ſmall a quantity to be diſtinguiſhable, among them in the narroweſt crevices; we find indeed in general, that water tho' ever able to diſlodge and carry to new places the ſmall particles of various Foſſils, yet is very ſeldom able perfectly to diſunite them, or make them pure from their admixtures with one another.

SERIES II.

Class I. Order I. Genus III.

PYRITERCIA.

Septariæ divided by Septa, of the matter of the Pyrites.

Of this there is only one known Species.

Several of the Septariæ are liable by accident to have the matter of the Pyrites inſinuate itſelf into their cavities, but this is the only determinately pyritical ſpecies, as never having any other matter for its Septa, and always having that matter alſo in its maſs.

1. *Pyritercium mollius, pallide fuſcum.*
Soft, pale brown Pyritercium.

This is a very ſingular and very elegant ſpecies; it is of a ſomewhat coarſe and lax texture, and often if nicely view'd, appears a little porous; it is of a very ſmooth, even and regular ſurface, and in ſize ſeldom exceeds ſix inches in diameter; its ſhape is various and uncertain, ſometimes it is broad and flat, but generally of a roundiſh or oval figure; and in the firſt caſe is commonly found naked in the ſtrata, in the laſt generally inveſted with a thick whitiſh cruſt; it is of a very agreeable pale whitiſh brown colour, breaks with an irregular ſurface, and if apply'd to the tongue, has a ſtrong vitriolick taſte which is peculiar to it, none of the others having the leaſt tendency to any thing of this kind; its Septa are very ſingular and very beautiful, they are generally pretty numerous, diſpers'd very irregularly thro' the ſubſtance of the maſs, never very thick, and are compos'd of a very elegant double plate of the common vitriolick Pyrites, the Stone very eaſily ſeparates at theſe, and the plates of theſe from one another, which is ſingular in this ſpecies as in almoſt all the others, except the two or three earthly ones before deſcribed; the matter of the Septa which is a pure Spar, ſerves as a band of union to the Stone, and makes it more ſtrong where they are, than in any other place, and conſequently readier to break any where than at or between their plates which ever cohere very firmly; if we conſider, however, that theſe are no better than plates of a vitriolick ſalt, and recollect how very ready all the Pyritæ are to ſhoot and fall to pieces in the air, we cannot wonder that this ſhould moſt eaſily break at the place of union where the cement is ſo weak, or that the Stone naturally and without a blow falls to pieces at all theſe Septa, after having been ſome time expos'd to the air, as indeed it ever does; the maſs is not divided into any regular Tali, is very ſoft and friable, and not capable of any poliſh. Water eaſily finds its way into its ſtructure.

It will not give fire with ſteel.

It ferments briſkly with Aqua Fortis.

It burns to a duſky reddiſh brown.

Examin'd by the Microſcope, it appears of a very lax and ſpungy texture, of a perfectly dull ſurface, with a few looſe ſpecks of Spar; and tho' the Pyrites is ſo plainly diſcoverable to the taſte in every part of the maſs, yet it is ſo perfectly and regularly blended with its ſubſtance, that no aſſiſtance of glaſſes will make it diſcoverable to the eye; the Septa examin'd with good glaſſes afford a moſt pleaſing object, they are thin plates of the matter of the Pyrites of all the gaudy colours of the rainbow, and all compos'd of a multitude of extreamly minute but regularly cubic concretions.

This is the only ſpecies of Septaria I have met with always containing Septa of this ſubſtance, and the only ſpecies in which any thing vitriolic is diſcoverable to the taſte; and hence we may learn among many other ſimilar proofs, that the matter of the Septa of all theſe bodies, tho' it appears ſo very different from their common ſubſtance, is ever truly a part of it, and was originally emboided in it; whence the continual pervaſion of water while the bodies lay in their original ſtrata has diſlodg'd, and bore it into the cracks it found in them, and there left it to concrete in its original purity, and make the Septa, as the plates that fill up thoſe cracks are call'd, of the ſame ſubſtance with the ſparry, vitriolick, or other matter before blended among that maſs.

SERIES II.

CLASS I. ORDER I. GENUS IV.

DIAUGOPHRAGMIA.

Septariæ, whoſe Septa are of Spar with an admixture of Cryſtal; the cryſtalline matter alſo ſometimes mixed among the matter of the Tali, and rendering the whole more bright and gloſſy.

Theſe ſometimes vary from the common order of nature in the Claſs, and run into continued ſtrata; this, however, is no more than an accidental variety, the nature of the body being like the reſt to form detach'd maſſes.

1. *Diaugophragmium ferrugineo-rubens, Septis fuſco-flaveſcentibus. Ferrugineous-red Diaugophragmium, with browniſh yellow partitions.*

This is a very elegant and beautiful body, the ſtructure of which has never yet been underſtood, nor ever could have been but by the aſſiſtance of the ſeveral teſts of the Microſcope acids, and fire. Dr. Woodward ſeems to have deſcrib'd it, tho' very imperfectly, among his Ludus Helmontii, V. 2. p. 9. Sp. 67. It is of an extreamly fine, compact and cloſe texture, of a very ſmooth, even and gloſſy ſurface, and very various in ſhape and ſize, the more frequent ſpecimens are found in oblong or oval maſſes, generally very much compreſs'd and flatted of from three to twelve inches in diameter, and from four to ſix in thickneſs; theſe are frequently found in digging, lying perfectly looſe, and at conſiderable diſtances one from another, but the ſame ſubſtance is not unfrequently found at ſome feet deeper, form'd into regular, orderly and perfect ſtrata, from two feet to as many inches in thickneſs, and divided in the ſame manner as the looſe maſſes by Septa of Spar; it is never that I have yet obſerv'd inveſted with any cruſt; and is of a very agreeable duſky browniſh red colour, unequally mix'd in the different maſſes, and ſometimes in the different parts of the ſame; in ſome places the colours being almoſt diſtinct, and in form of clouds or ſpots, and in others perfectly united, and compoſing one plain colour between them; it breaks with a very even and gloſſy ſurface, and has no looſe ſhining ſpecks; its Septa are very frequent, and conſiderably thick, they have the general appearance of a ſtriated texture, and are compos'd of an orderly arrangement of the ſhoots of a browniſh yellow columnar Spar, of leſs brightneſs and tranſparency, but of greater hardneſs than that of the Septa of the generality of the other ſpecies, and very irregularly cryſtalliz'd at the ſurfaces; the maſs is divided by theſe Septa into a number of irregular Tali, of very different ſhape and ſize, being of from three to ſix ſides, and from half an inch to four inches in diameter; and in ſome inſtances the Septa are ſo irregularly diſpos'd, that they cannot be ſaid to divide the maſs into Tali at all; the ſtony matter is of very great weight, extreamly hard, and capable of a poliſh equal to that of the hardeſt marble. Water has no power to enter its ſtructure.

It may, but not without great difficulty, be made to ſtrike fire with ſteel.

It ferments briſkly with Aqua Fortis.

It burns to a paler reddiſh brown.

Examin'd by the Microſcope, it appears of a very regular and beautiful ſtructure, of a ſmooth and gloſſy ſurface, with no looſe ſhining ſpangles, very tranſparent at the edges, and of a beautiful pale reddiſh brown; the Septa are irregularly columnar in their ſtructure, and both in the body of the ſhoots and at their points manifeſtly diſcover a tendency toward the hexangular figure of Cryſtal.

It is very common in Yorkſhire, and moſt of the northern counties, where it is found both in digging and on the ſea ſhores, as alſo lodg'd in the clifts; on the ſhores are found not only the naturally looſe nodules, but among them multitudes of others, which have been broken off, perhaps in angular fragments, from the ſtrata or larger nodules lodg'd in the clifts, and are conſtantly found worn to a roundneſs by the motion of the waves.

The difference of this, from the more ordinary ſpecies of Septaria, is entirely and only owing to its having taken up a quantity of cryſtalline matter among the earthy and ſparry matter at its original concretion, and this is not only found in the matter itſelf, but even in all the Septa; the maſs's ſtriking fire with ſteel is alone a ſufficient proof of its containing Cryſtal, ſince neither Spar nor Earth can do that; but this is more plainly evinc'd by the other teſts, when Aqua Fortis has diſſolv'd what it can of it, the remainder, which that menſtruum will not touch, nicely examin'd, will be found to conſiſt of clay, and a quantity of clear fine Cryſtal in extreamly ſmall Moleculæ: the Microſcope ſhews the mixture of that ſubſtance evidently in the Septa, nor does the ſame menſtruum diſcover it leſs there, ſince the matter of theſe, which is naturally entirely ſoluble in Aqua Fortis, in this ſpecies leaves a plain quantity of Cryſtal behind, which it cannot touch; and the maſs, when ſlightly calcin'd, ſhews, on a nice examination, that tho' the greater quantity of the matter be calcin'd, and render'd opake, ſhattery, and duſky, yet there are lucid ſpecks now diſcoverable in it, which were not to be ſeen before, and which are tolerably tranſparent, and of a good water: theſe are evidently the ſame Moleculæ with thoſe left by the acid menſtruum; and any one who has made experiments on Foſſils, and knows how much ſooner and more eaſily Spar is to be calcin'd than Cryſtal, will eaſily determine theſe to be Cryſtal, which tho' not affected by that degree of heat, yet would eaſily be calcin'd, crack'd, and ſhatter'd, and render'd opake by a greater; as a ſecond experiment in a fiercer fire will prove.

2. *Diaugophragmium flavo-ferrugineum, durius ſeptis albicantibus.*
Browniſh-yellow Diaugophragmium, with whitiſh partitions.

This is a very elegant Foſſil; it is of an extreamly cloſe, compact, and firm texture, of a perfectly ſmooth ſurface generally, tho' ſometimes a little unequal, very various in ſhape and ſize, and ſometimes found in continu'd ſtrata, tho' much more frequently in irregularly ſhap'd, but always compreſs'd and flatted maſſes, of different breadths, from three or four to twelve or fourteen inches in diameter, and generally of about five inches in thickneſs; theſe detach'd nodules are not only found on the ſhores, where they might be ſuppos'd to have been waſh'd out from among the ſtrata in the clifts, but are ſeen looſe and at many yards diſtance from one another in the clifts, and are frequently found lodg'd ſeparately in the ſtrata in digging; they are ſeldom inveſted with any cruſt, when they have one, it is of a ruſt colour, and of about one third of an inch thick. The colour of this ſpecies is a very elegant ferrugineous yellow, it breaks with a perfectly ſmooth and gloſſy ſurface, and looks much of a flinty texture; the Septa are very thick and broad in many places, and are very plentifully ſcatter'd thro' the maſs; they are of a white ſemi-pellucid Spar, very hard, and not of a columnar, but rather irregularly complex or tabulated texture, and ſeem made up of a vaſt number of irregularly parallellopiped concretions, amaſs'd together, and cohering firmly one with another; the matter of the maſs is by theſe divided into a multitude of irregular Tali, of one, two, three, or four inches diameter, and of an unequal number of ſides; it is very heavy, of great hardneſs, tho' ſomething inferior in that reſpect to the former ſpecies, and is capable of a very elegant poliſh; the Septa, take it equally with the maſs and together make a very beautiful appearance. Water cannot at all find its way into its pores.

It very difficultly is made to give fire with ſteel.

It ferments pretty briſkly with Aqua Fortis.

It burns to a duſky red.

Examin'd by the Microſcope, it appears of a very gloſſy ſurface, and fine even texture,

ture, has no looſe ſhining ſparks, and is tranſparent, but in a leſs degree than the former, in ſmall flakes; the matter of the Septa is evidently Spar, a little alter'd in its figure by an admixture, and accordingly, like the former, it leaves a little Cryſtal on ſolution, as does alſo the matter of the Tali.

I have only once met with this, which was ſome years ſince, about twelve miles beyond Scarborough, where it lay in vaſt quantities on the ſhores, in the clifts, and among the clay in the inland places.

3. *Diaugophragmium albo-ſubcæruleum, ſeptis ſtramineis.*
Blueiſh-white Diaugophragmium, with ſtraw-colour'd partitions.

This is a third ſpecies, of the ſame ſubſtance and ſtructure with the two former, and ſeeming only to differ from them in the earthy matter by which it is debas'd.

It is of a moderately fine, compact, and cloſe texture, of a rough, rugged, and unequal ſurface, and very various in ſhape and ſize; it is generally found in looſe maſſes of a compreſs'd ſhape, little tending either to round or oval, but generally of rugged edges, and from four to eighteen inches in breadth, and from two to ſix in thickneſs; beſide theſe, however, it is ſometimes found, like the two former ſpecies, in continu'd and regular ſtrata: it is never, that I have yet ſeen, inveſted with any cruſt; its colour is a very agreeable grey, made up of a mixture of blue and white, and it breaks with a gloſſy and very even ſurface, without any ſhining ſpecks; the Septa are of a very beautiful and very pale whitiſh-yellow; they appear of a ſtriated texture, and are compos'd of a fine pellucid and bright irregularly columnar Spar, which is alſo ſhot into irregular points at the commiſſures of the two plates, which in this, and all the other ſpecies, naturally form each Septum; the maſs is of conſiderable weight, moderately hard, and capable of a good poliſh. Water does not at all enter its ſtructure.

It will not without great difficulty be made to ſtrike fire with ſteel.

It ferments very briſkly with Aqua Fortis.

It burns to a duſky white.

Examin'd by the Microſcope, it appears of a moderately even ſtructure, and gloſſy ſurface, but not without ſome looſe ſpangles, tho' they were not viſible to the naked eye; the Septa are of an elegant, tho' irregular ſtructure, and are no other than a rude admixture of irregular columns of a cryſtalline Spar; pure Cryſtal diſcovers itſelf in this by all the tryals that it does in the two former ſpecies.

It is common in Yorkſhire, and all the northern counties, but I have never met with it within ſixty miles of London.

SERIES II.

CLASS I. ORDER II. GENUS I.

BRACHYPYRENIA.

Cruſtated Septariæ, with a ſhort, roundiſh Nucleus, encloſ'd by, and contain'd within the body of the maſs.

1. *Brachypyrenium pallide-flaveſcens, Nucleo fuſco ferrugineo.*
Pale-yellow Brachypyrenium, with a ruſt-colour'd Nucleus.

THIS is a very elegant and beautiful body, of a moderately compact, cloſe, and firm texture, of a tolerably ſmooth and even ſurface, of a pretty regularly roundiſh figure, and always of about four inches in diameter, very few ſpecimens of it having been found either much larger, or much ſmaller than that ſize; it is ever inveſted with a thin pale-colour'd external cruſt, and is compos'd, within that, of three, four, five, or more other cruſts, of different thickneſs, but all of the ſame ſubſtance, and very nearly of the ſame colour and texture; theſe are of a moderately firm texture, and of a very agreeable pale-yellow, break with a tolerably ſmooth ſurface, and ſhew a conſiderable quantity of lucid ſpecks of Spar, if attentively view'd where freſh broken; theſe cruſts incloſe a central Nucleus, of a hard ferrugineous Stone, and are divided from it by a thin, but regular and very beautiful Septum, of a ſtraw-colour'd Spar, of a ſeemingly ſtriated texture; from this there run out a great many other ſtrait Septa, tending directly from this Nucleus to the circumference, but growing narrower as they approach the ſurface, and rarely paſſing thro' more than two of the cruſts; theſe have evidently been, as in all the other Septaria, originally cracks, made by the receding of the parts from one another in the drying; the firſt of which has ever been, as might naturally be expected, a circular one, between the ſolid Nucleus and the containing cruſt; this has been ſince fill'd up with Spar, and makes the beautiful circular Septum, and the cracks from this are generally perfectly fill'd up in the ſame manner, tho' ſometimes they are found in part empty. It is evident alſo in this body, that there have been cracks form'd at different times, and that long after each other, even after the firſt Septa were form'd, for it is common in this ſpecies to find other cracks, both horizontal and perpendicular, pervading the very ſubſtance of the Nucleus thro', and running thro' the firſt, and perhaps the ſecond cruſt; theſe cracks are frequently empty, and breaking thro' the circular Septum, leave a gap in that place in it; ſometimes, however, they are themſelves fill'd up, and made into Septa of a ſeemingly ſtriated texture, the Striæ of which always are ſeen in the place where they paſs the circular Septum of a contrary direction to thoſe of that, and are an evident proof, that that Septum was firſt form'd, and afterwards was broken thro', and the crack that paſs'd it fill'd up by this laſt form'd Septum; the maſs is not at all divided into Tali, is moderately heavy, leſs hard than many of the other ſpecies, and ſcarce capable of any poliſh. Water does not eaſily get into its texture.

It will not ſtrike fire with ſteel.

It ferments violently with Aqua Fortis.

It burns to a duſky browniſh red.

The Nucleus, which is ever of an oblong or oval figure, is a perfectly extraneous body, and of a different ſtructure, and compos'd of entirely different matter from the reſt; it is of a browniſh ruſt colour, of a firm texture, very heavy, and hard enough to take a good poliſh; it ſtrikes fire freely with ſteel; does not ferment with Aqua Fortis, if ſeparated cleanly from all the Cruſts and Septa, and burns to a ſtrong red: this is therefore a Stone whoſe baſis is a cryſtalline matter, into which has been admitted, at its original concretion, a large quantity of ferrugineous matter, and of a deep brown clay: this Nucleus, as we ſhall ſee hereafter, for it is of the ſame general ſtructure in all the ſpecies, according to the matter it concreted among, has acquir'd a different covering: in this, falling into a quantity of this kind of Septaria, almoſt concreted; it is natural, as for a ſnow-ball to grow larger by being roll'd in the ſnow, for this by rolling about in this matter, to acquire more and more cruſts.

Examin'd by the Microſcope, it appears of a ſomewhat looſe and open texture, and ſpangled very thick with ſmall lucid ſpecks of looſe Spar; the Nucleus appears a plainly cryſtalline Stone, approaching much to the texture of the flints, but coarſer by a greater admixture of earth, and conſequently of a leſs even and ſhining ſurface; it is in thin pieces, however, very fairly tranſparent, and of a fine agreeable brown; the Septa, which divide the Nucleus from the cruſts, and the ſubſtance of the Nucleus itſelf, as well as that of the cruſts which compoſe the body of the maſs, are all of the ſame ſubſtance and texture with thoſe of the other Septariæ; they are compos'd of two very thin plates of a columnar Spar, the columns of which, by their regular arrangement, affect a ſtriated appearance, and the ends of all are beautiful trigonal; the ſubſtance of theſe is a very pure and bright Spar, of a fine clear brimſtone colour.

I firſt met with this elegant body on Mendip Hills, where many ſpecimens of it were thrown up in different places; ſince that time I have obſerv'd it in the clay pit near Iſlington, lying at about eight or nine feet depth.

2. *Brachypyrenium albido fuſcum, Nucleo è fuſco nigricante.*
Browniſh Brachypyrenium, with a blackiſh brown Nucleus.

This is a ſpecies of equal elegance and beauty with the former. It is of a moderately fine, compact and cloſe texture, of a very ſmooth, even and regular ſurface, always of a pretty regular orbicular figure, tho' generally a little flatted, and very regular in ſize; its uſual diameter is of from two to three inches, and few ſpecimens are found much larger or ſmaller. It is inveſted with no adventitious external cruſt, like that of the former, but is compos'd of a hard blackiſh brown central Nucleus, of a compact ſtructure, enclos'd in a thin cruſt of a paler colour, but of the ſame ſubſtance with itſelf; the Nucleus of about half an inch diameter, this cruſt about one eighth of an inch thick; theſe together are properly enough call'd the general Nucleus of the maſs, which is compos'd of two other cruſts of about equal thickneſs, of different degrees of brown, and of the ſame ſtructure and ſubſtance with the other Septariæ; the Nucleus enclos'd in its peculiar cruſt, is divided from theſe by a thin orbicular ſeptum of a fine whitiſh columnar Spar: from this, as in the preceding ſpecies, there run ſeveral other ſmall and ſtrait Septa, tending to the circumference of the Stone, but ſeldom paſſing the inner cruſt; the Nucleus in this ſpecies alſo is generally found divided by both perpendicular and horizontal cracks, at which it always ſeparates in breaking; theſe are ſometimes empty, but oftener are imperfectly fill'd with the matter of the other Septa, which both here and in the former inſtance has been evidently educ'd from among the matter of the Septariæ; for in the former, the Nucleus itſelf could furniſh no ſuch matter, and in this not eaſily enough of it to make Septa; the Nucleus is hard and ſtony, but leſs ſo than in the former; the body of the maſs breaks pretty eaſily, and with a tolerably even ſurface, and if attentively view'd, is found full of ſmall ſpecks of looſe Spar. It is conſiderably heavy, and moderately hard, but not capable of any thing of a poliſh. Water ſlowly gets into its ſtructure.

It will not ſtrike fire with ſteel.

It ferments very violently with Aqua Fortis.

It burns to a whitiſh grey.

The Nucleus is of the ſame cryſtalline baſis in this as in the former; but beſide its earthy and ferrugineous matter, is in this debas'd alſo by an admixture of Spar: Hence it but difficultly gives fire with ſteel, and raiſes a ſlight effervеſcence with Aqua Fortis.

Examin'd by the Microſcope, the Nucleus is ſeen a plain Stone, of a flinty ſtructure, but ſomewhat coarſer than the ordinary flints, as debas'd by earth, and even by Spar; which laſt they never have in their compoſition. It is of a very cloſe ſmooth texture, and tranſparent in thin pieces, and there appears of a very pale brown. The matter of the maſs is of a tolerably compact texture, and ever more ſo in the inner than in the outer cruſt, tho' the outer is truly a part of the ſubſtance of the Stone, and no adventitious matter. It is always ſpangled with a greater or leſſer number of lucid ſpecks of looſe Spar. The Septa are of a very pure white Spar, often of a columnar, and thence appearing of a ſtriated texture, and often alſo of a complex and irregularly tabulated one, forming no columns, but parallellopiped inſtead of trigonal concretions; the Spar here alſo frequently does not fill up the whole crack, but is inviron'd on each ſide with a cruſt of a pale whitiſh grey earth.

I have met with this in Northamptonſhire, Leiceſterſhire and Yorkſhire, and once or twice about London, but it is not common, nor very plentiful any where; the clay pit at Iſlington, and that near Tyburn, ſometimes afford a few ſpecimens of it, which generally lie at about 12 feet deep.

3. *Brachypyrenium duriſſimum, albido-griſeum, Nucleo fuſco.*
Hard, whitiſh-grey Brachypyrenium, with a brown Nucleus.

This is a very ſingular body, tho' of leſs beauty than the former ſpecies. It is of a very fine, compact and cloſe texture, of a ſmooth and even ſurface, ever of an orbicular or oval ſhape, but generally a little flatted, and always very regular in ſize; its diameter being naturally of about two inches, and it very ſeldom exceeding or falling ſhort of that ſize by a quarter of an inch. It is ever inveſted with a pale whitiſh yellow cruſt, of the nature of thoſe of the other Septariæ. And is compos'd of a brown central Nucleus, inclos'd in one cruſt of its own hardneſs, but of a ſomewhat paler colour, after this with a fine ſparry circular ſeptum, and over this with two other thicker cruſts, of a whitiſh grey; the central Nucleus is of about one third of an inch in diameter, the cruſt that immediately ſurrounds it about one fifth; theſe are both very firm and hard; the two outer cruſts which compoſe the body of the maſs, are of a pale whitiſh grey; they break with a very ſmooth ſurface, and ſhew very few ſpangles of looſe Spar. The circular ſeptum is of a complex parallellopiped Spar, and from it run generally three or four narrow Septa, ſtrait toward the ſurface, but ſeldom reaching into the outer cruſt; the maſs is never divided by theſe into any thing like Tali. It is moderately heavy, very hard, and capable of a fair poliſh. Water does not at all find paſſage into its ſtructure.

It will not give fire with ſteel.

It ferments very violently with Aqua Fortis, and is almoſt wholly diſſolv'd by it.

It burns to a duſky white.

The Nucleus is not very different from the reſt of the maſs in its nature or ſtructure, it contains indeed ſome Cryſtal; but is ſo highly debas'd by Spar and earth, that it will not at all give fire with ſteel, and ferments ſtrongly with Aqua Fortis.

Examin'd by the Microſcope, it appears of a very cloſe and fine texture, but in moſt parts ſpangled with a few looſe ſpecks of Spar. The Nucleus is of a cloſer texture than the reſt, otherwiſe little differing, and the Septa of a duſky browniſh Spar, leſs bright and pellucid than that of many of the ſpecies, but filling the whole cracks it is plac'd in, and compos'd of an irregular collection of parallellopiped concretions, not a parallel diſpoſition of columnar bodies.

It is a very rare ſpecies; I do not remember to have met with it more than twice, the firſt time many years ſince in Leiceſterſhire, the latter this laſt winter near Highgate, but in the laſt place where it lies in the great clay pit, at ſeven or eight feet deep, there is but very little of it.

4. *Brachypyrenium minimum ferrugineum, forma rotunda & oblonga.*

The ſmalleſt ferrugineous Brachypyrenium, of roundiſh or oblong form.

This has been generally known by the name of Bezoar mineral, and claſs'd among the cruſtated ferrugineous bodies, as indeed have all three of the preceding Species. It is certain, that this contains a little iron, but when we conſider its nature and ſtructure, and find it compos'd of Spar debas'd by earthy and other admixtures, crack'd in the drying, and found with thoſe cracks ſometimes empty, ſometimes fill'd up into fine regular Septa, by double plates of a columnar Spar, and its external coat ever of the ſame texture, and compos'd of Spar debas'd by a very large admixture of earth, and that not only the ſame with the coats of all the Septariæ, but a ſubſtance which no other bodies but theſe are ever coated with, we cannot ſurely allow this little ſpecies to be rank'd among any other than theſe, the bodies of its own Nature, and of the ſame Genus.

This is a very elegant little body, of a cloſe, firm and compact texture, of a ſmooth and even ſurface, always either of an orbicular or oblong form, and generally of about three fourths of an inch in diameter; there are few ſpecimens of more than an inch, or leſs than half a one, and the far greater number are of the middle ſize between that: They are from half an inch to two inches in length, and very ſeldom exceed that; they are ever inveſted with a cruſt of a pale whitiſh ſubſtance, the ſame with that of the other Septariæ, which is naturally of about one ſixth of an inch thick, but ſometimes is found much thicker; they are all compos'd of a large central Nucleus, ſometimes environ'd with two or three cruſts of ferrugineous matter, ſometimes blended more irregularly with it, and making together one only Nucleus ſurrounded by its cruſt. The Nucleus and cruſt are generally divided into three, four or five parts, by pretty large cracks; theſe differ from the cracks of all the other Septariæ in this, that as they are wideſt in the center of the maſs, and are generally loſt before they reach the external cruſt, which they ſcarce ever at all affect; theſe, on the contrary, are wideſt externally, and in the cruſt, and become narrower as they approach the center of the maſs; theſe cracks divide the maſs irregularly, but when ſtruck it ever breaks at them; they are commonly empty toward the ſurface; but as they approach the center of the Stone, are ever fill'd up, and made regular Septa, by a fine and very pellucid tabulated Spar. The cruſt of theſe bodies anſwers the characters of the others of this kind. The bodies themſelves are very heavy, conſiderably hard, and capable of a very good poliſh. Water cannot at all enter their ſtructure.

It will not without difficulty give fire with ſteel, and when ſeparated nicely from the Septa, ferments but very languidly with Aqua Fortis, and has a very ſmall part of its ſubſtance only ſoluble in that Menſtruum.

In the fire it acquires a deep reddiſh brown.

Examin'd by the Microſcope, the cruſt appears of a ſomewhat lax texture, and ſpangled very thick with ſmall pieces of looſe Spar; the Nucleus is of a very cloſe, compact and flinty appearance, of a ſmooth and ſomewhat gloſſy ſurface, and in thin pieces ſomewhat tranſparent; it is plainly compos'd of a cryſtalline matter, debas'd by an admixture of ferrugineous and earthy particles, and by a ſmall quantity of Spar; the Septa are of a very elegant ſtructure; they are compos'd of a fine white pellucid Spar, form'd into looſely complex'd tabulæ, and are of a very ſingular brightneſs; it is not eaſy to find them whole, becauſe their texture not ſuffering them to be ſo firm a band of union as the Septa of the columnar Spars are, the maſs generally breaks at them; but if the newly ſeparated ſides be examin'd, each will be found cover'd in ſome degree with a thin cruſt of this elegant ſubſtance.

It is common in the brick and tile clay pits about London, and in almoſt all other parts of the kingdom. I have alſo received of it from Germany.

SERIES II.

CLASS I. ORDER II. GENUS II.

MACROPYRENIA.

Cruſtated Septariæ, with a long Nucleus ſtanding out at each end of the maſs.

Of this Genus there is only one known ſpecies.

1. *Macropyrenium oblongum, pallide fuſcum, Nucleo longiſſimo cavo. Oblong Macropyrenium, of a pale brown, with a long hollow'd Nucleus.*

THIS is one of the moſt ſingular and extraordinary bodies of the mineral kingdom. It has not been mention'd by any writer on theſe ſubjects, nor have I ever heard of it, except in one place, where I diſcover'd it about two years ſince in great plenty.

It is plainly of the ſame Claſs with the four bodies before deſcrib'd, and in ſome degree approaches to the figure and texture of the firſt of them.

It is of a very cloſe, compact and firm texure, of a very rugged and unequal ſurface, ever of a determinate, and very ſingular ſhape, which is an oblong and cylindric figure, largeſt in the middle, and gradually leſſening towards each end, till it come within half an inch, or thereabouts of each, where it ends in a ſmaller cylindric ſubſtance, of a different colour, being much paler and almoſt whitiſh, and of a much harder ſubſtance; this is evidently ſeen to be not the outer ſubſtance, but an elongation of ſomething contain'd within, and making its way thro' it; this ends in an irregular and obtuſe point, and is truly the extremity of the ſtrange Nucleus of this body. In ſize it is one of the moſt determinate and regular of all the native Foſſils. Its length is between ſeven and eight inches, and its diameter in the center or thickeſt part three inches; and I never yet ſaw a perfect ſpecimen that varied ſo much as half an inch either way from this ſtandard; this is the external figure of this ſingular body. When broken, we find it compos'd of a central Nucleus of a ferrugineous colour, naturally hollow, but commonly fill'd up with an earthy matter; this is enclos'd in a thin cruſt, of a browniſh matter, of almoſt equal hardneſs; theſe are ſurrounded with a ſingle, double, or in ſome ſpecimens a triple circular Septum, of an elegant columnar Spar; which is again environ'd by two thick cruſts of a browniſh matter of the kind of the reſt of the Septariæ; this makes the body of the maſs, and is divided by four or five other Septa, parting like rays from the circular one, and making ſtrait towards the circumference of the Stone, but generally loſing themſelves in the firſt or ſecond cruſt, and the whole of this is ſurrounded by a rugged and unequal whitiſh brown coat, of about one third of an inch in diameter.

The cavity of the central Nucleus is of half an inch diameter. The whole Nucleus itſelf, as enclos'd in the circular Septum, about an inch in diameter; the Septum itſelf leſs than the twentieth part of an inch, and the outer cruſts about equal. This is the ſurface of the Stone, when broken acroſs; and I have been the more particular in the deſcription of it, as not only a very ſingular thing, but as far as I have yet ſeen a perfectly regular one, ſmaller or larger ſpecimens of this body there may be, and indeed of many others, which I have attempted to determine, from the obſervations I have been able to make; but theſe will not miſlead in any of the inſtances; it is good to know the general ſize of bodies of this kind, tho' ſhou'd one of theſe of but half an inch in diameter hereafter be found, I ſhou'd readily allow it, if it had the ſame characters, to be of the ſame ſpecies.

The central Nucleus of this ſtrange body examin'd ſeparately, is a long cylindric tube, ending in an obtuſe point at each end, and tho' naturally empty, yet frequently found fill'd either with a white Marle, or which is more common, with the matter of the Septaria it is contain'd in. It is ſubject to a great number of cracks, many of them viſible, others imperceptible, ſome longitudinal, but the greater part horizontal: at theſe it naturally divides when ſtruck, and theſe are often ſo frequent, that it may be ſtruck off into a number of pieces, each of not more than one tenth of an inch in thickneſs, and reſembling ſo many large Trochitæ. The pieces it moſt naturally and eaſily breaks into, however, are three, a middle, cylindric one, and two in ſome degree conic pieces, which were the ends; the maſs it is generally envelop'd in, is ſometimes alſo crack'd, and ſhatter'd in ſuch a manner, as to fall to pieces of itſelf, and leave theſe three pieces into which the Nucleus ever breaks, naturally looſe; it was in this condition that I firſt found them, and cannot remember ever to have been more ſurpriz'd, than at the ſingularity of their appearance. This Nucleus is very heavy, of great hardneſs, and capable of a fine poliſh. Water does not at all pervade its ſtructure.

It will not readily give fire with ſteel.

It raiſes a ſlight and languid fermentation in Aqua Fortis, and is evidently compos'd of a mixture of cryſtalline and ſparry matter, debas'd by a large quantity of ferrugineous earth.

The body of the maſs is leſs hard and heavy than this Nucleus, and ſcarce capable of any poliſh. It will not admit water into its ſtructure.

It will not ſtrike fire with ſteel.

It ferments violently with Aqua Fortis, and is in great part diſſolv'd by it.

It burns to a pale duſky whitiſh colour.

The Septa are extreamly beautiful; they appear of a ſtriated texture, are of a pure white Spar, and look very bright where freſh broken; the cracks in the Nucleus of this body are commonly empty, ſometimes fill'd up with a black ferrugineous earth, and ſometimes, tho' that is leſs frequent, with this Spar; in theſe, however, it never is very compact, nor ever forms perfect Septa.

Examin'd by the Microſcope, the Nucleus appears of a coarſe flinty ſtructure, of a pale brown, and tranſparent at the edges, or in thin pieces, the body of the maſs of a ſomewhat laxer texture, and ſpangled with lucid ſpecks of Spar, and the Septa truly columnar, and form'd at their tops, each column into a trigonal point.

I never yet found this ſpecies containing ſhells, or any other extraneous body, nor ever met with it, except in one place, which was the great tile clay pit behind the Black Lyon Alehouſe, in Tyburn Road, over-againſt Hide Park wall, about three quarters of a Mile beyond Tyburn; they there lay at different depths, ſome at eight, ſome at twelve, but more at twenty feet deep, moſt of them whole, and environ'd with their natural cruſts, but ſome broken into the three pieces they naturally fall into; and in other parts of the pit, were many of the disjointed pieces, ſome empty, others full of earthy and other matter, and looſe from their containing maſs.

FOSSILS

NATURALLY and eſſentially compound, not inflammable, nor ſoluble in water.

Series the ſecond.

Claſs the ſecond.

SIDEROCHITA.

Cruſtated Ferrugineous Bodies.

Foſſils of a moderately firm and compact texture, and cruſtated ſtructure; compos'd of ferrugineous mixed with earthy matter, and form'd of repeated incruſtations, making ſo many coats or cruſts round a ſofter or harder Nucleus, or round looſe earths, or an aqueous fluid.

Of this Claſs there are two Orders, and under thoſe four Genera.

SIDEROCHITA.

Order the firſt.

Thoſe which contain regular and ſolid Nuclei.

SIDEROCHITA.

Order the ſecond.

Thoſe which contain no ſolid Nucleus, but looſe earthy matter in form of powder, or an aqueous fluid.

SIDEROCHITA.

Order the firſt.

Genus 1. EMPHEREPYRA. *Thoſe which are compos'd of various cruſts ſurrounding a Nucleus of the ſame matter and ſtructure with themſelves.*

Genus 2. HETEROPYRA. *Thoſe which are compos'd of cruſts ſurrounding a Nucleus of a different ſubſtance from themſelves, and often looſe and ratling in them.*

SIDEROCHITA.

Order the ſecond.

Genus 1. GEODES. *Thoſe which are compos'd of cruſts, form'd into large and in great part empty caſes, encloſing a ſmall quantity of looſe, earthy, or arenaceous matter.*

Genus 2. ENHYDRI. *Thoſe which are compos'd of cruſts, form'd into large and in great part empty caſes, encloſing a quantity of an aqueous fluid.*

Dr. Woodward has attempted an arrangement of theſe bodies, but obſervation ſhews, that his diſtinctions between the Bezoar minerals, and Geodes, or baſtard Ætitæ, are built on accidents; the crumbling away of one of the inner cruſts in theſe bodies, being capable of converting a Bezoar mineral into Ochreo ferrugineous Ætites or Geodes.

SERIES II.

CLASS II. ORDER I. GENUS I.

EMPHEREPYRA.

Siderochita, compos'd of various cruſts or coats, ſurrounding a Nucleus of the ſame Matter and Structure with themſelves.

1. *Empherepyra duriſſima, lævior, cruſtis fuſcis, flavis & rubentibus.*
Very hard, ſmooth Empherepyra, with brown, yellow, and red cruſts.

THIS is a very regularly conſtructed, and often a very beautiful body. It is of an extremely fine and compact texture, of a tolerably ſmooth, and even ſurface, and very remarkably heavy. It feels tolerably ſmooth to the touch, and is never very different in ſize, and ſcarce at all ſo in figure. It is ever of either a roundiſh, or oblong figure, and moſt uſually of the latter; and is found from a quarter of an inch, to three or four inches in length; but its moſt uſual ſtandard, is either a ſhort oval, of the ſize and ſhape of a pidgeon's-egg, or an oblong figure, from one to two inches in length; and from half an inch, to one inch in thickneſs, in the largeſt of thoſe ſpecimens.

It is ſometimes found naked, and is then tolerably ſmooth, and ſomewhat gloſſy on the ſurface; and at others, it is cover'd with a cruſt of a whitiſh matter, reſembling in all reſpects the coats of the Septariæ. It breaks with a tolerably ſmooth and even ſurface, and is ſeen to be compos'd of five or ſix cruſts, encloſing a firm, hard, and ſolid Nucleus, of the ſame nature and ſtructure with themſelves. This is very hard and firm, and is ſometimes of a deep and duſky brown; ſometimes of a ſtrong, tho' not bright red; and very frequently of a mixture of theſe two colours; either wholly blended together, or lodg'd in form of ſpots, in one another. The cruſts which ſurround this, are of the ſame hardneſs, and are alternately browniſh, yellowiſh and reddiſh, the brown and red the ſame with thoſe in the Nucleus, and the yellow exactly the colour of ruſty iron. They are uſually diſpoſed in this order; a brown one ſurrounds the Nucleus, a yellow one ſucceeds that, over this there's a reddiſh one, then another yellow one, and over theſe a border of brown; but this order is not invariable. Sometimes they lye regularly, alternately over one another, and ſometimes they have ſo far run together, and blended one with another, that many of them ſeem wanting; nay, there are not wanting inſtances of the whole maſs forming one body, of a ſeemingly ſingular iron ore.

The body thus form'd is ſometimes found naked, but more uſually inveſted with its white coat, which is commonly about an eighth of an inch thick, and ſhews no part of the body 'till broken.

It will not ſtrike fire with ſteel.

It will not ferment with Aqua Fortis.

It burns to a deep purpliſh red.

Examin'd by the Microſcope, it appears of a much leſs regular ſtructure than to the naked eye, its cruſts running into one another. The brown part appears a very beautiful and rich iron ore, and ſeems of a ſtructure not much unlike coarſe iron, when broken; in many places alſo it appears for a little way of a ſmooth and even ſurface, as if it had been melted. The red and yellow cruſts appear much coarſer, and of a laxer ſtructure than theſe; and the white outer coat, very lax and ſpungy.

It is very common in its naked ſtate, both in the clay and gravel-pits, and on the ſhores of Yorkſhire, and in its coated ſtate is extremely plentiful about London, in many of our clay-pits. It is ſo rich an iron ore, that it might be work'd to advantage yielding more than a fourth part of that metal.

2. *Empherepyra dura, ſcabra, ſcintillans cruſtis, fuſcis, fuſco purpureis & ſordide flavicantibus.*

Hard, glittering, rough Empherepyra, with brown, purple, and deep yellow cruſts.

This is a much more rough and rugged body than the former; yet it is not without its regularity or beauty. It is of a coarſe and unequal ſubſtance, of a very rude and irregular texture, and is leſs heavy than the former kind. It is tolerably regular in ſize and ſhape, being always of an oblong figure, tho' with conſiderable variations; being ſometimes flatted, but more uſually round, and frequently very long and ſlender, tho' ſometimes ſhort, and either thick or broad. It is found of all ſizes, from half an inch to eight inches in length, but its moſt frequent ſtandard is about three inches, with this it is commonly rounded, and about three quarters of an inch in diameter; tho' ſometimes ſo compreſs'd or flatted, as to be two inches broad, and not half an inch thick. It is very harſh and rough to the touch, and is naturally of a ſcabrous rough ſurface, but by accidents it uſually becomes much more ſo. Its native ſurface when it has concreted pure, is ever regularly made up of ſmall prominences and cavities, much leſs than the heads of the ſmalleſt pins; and theſe give it a very remarkable harſh and cutting feel to the touch, and make it look about as rough as the common finer ſhagreen ſkin; but it is rarely found ſo pure as this, for having uſually concreted among gravel, the ſmaller ſtones of that matter have made impreſſions on its ſubſtance while ſoft, and in concreting it has uſually retain'd them; ſo that it is uſually found ſtuck full of ſmall pebbles, ſome only ſlightly, and on others deeply immers'd in, and the impreſſions of many others ſince fallen out, are ſeen on different parts of it making ſo many regular cavities; where the matter of the inner cruſts is as regularly ſeen, as on the breaking the whole maſs. Theſe pebbles are uſually ſo firmly fixed in, that the body breaks in attempting to ſtrike them out. It is conſiderably hard, and breaks with a rude, rugged, and unequal ſurface. It is then ſeen to be compoſed of a ſmall Nucleus, ſurrounded by eight or ten cruſts; theſe are of irregular thickneſſes, and are ſome of a paler, ſome of a deeper brown, others of a duſky, and ſomewhat reddiſh yellow, or orange colour; and others of a deep browniſh purple. They are ſeldom placed in a regularly alternate order, but are variouſly intermixed with one another, and the Nucleus is ſometimes of the purple, but more uſually of the orange colour'd matter. It is always found naked, having no other inveſtient coat but ſuch of its cruſts as happen to be outermoſt; and this is moſt frequently the orange colour'd one. It is conſiderably bright and ſparkling, and that not only where freſh broken, but even on its natural ſurface; the whole ſubſtance of all the cruſts, being full of very ſmall ſhining ſpangles, like extreamly minute flakes of Talc.

It will not give fire with ſteel.

It will not ferment with Aqua Fortis.

It burns to a mixt red and purple maſs, the yellow cruſts burning with the brown ones, to a ſtrong brick red, and the purple yet deeper than before.

Examin'd by the Microſcope, it appears a very coarſe maſs of a mixed ferrugineous and earthy matter, of a cavernous, and ſomewhat ſpungy ſtructure, and full of glittering ſpecks; which, when nicely examin'd, appear very plainly to be different from the common ſubſtance of the maſs, and evidently of the nature, tho' by no means of the ſhape of grains of ſand; it ſeems very evident, that to the formation of this body there has concurred a mixture of iron ore, earth, and ſand, while all were yet ſoft, and had not acquired their ultimate form.

It is common in the gravel-pits about Oxford, and lies at all depths, from three to ten foot. It holds but little iron, otherwiſe it would be worth working, being in ſome places beſide that mentioned, plentiful enough; as in many parts of Hampſhire and Suſſex.

3. *Empherepyra mollior, fuſco flaveſcens.*
Soft, browniſh-yellow Empherepyra.

This is an extreamly ſingular, and very beautiful body. It is of a perfectly different nature from the former Empherepyra, that being hard as ſtones; this almoſt as ſoft as earth; and that compoſed of an admixture of ferrugineous and ſtony, this of a ferrugineous, and merely earthy matter.

It is a very compact maſs, of an extreamly cloſe and ſmooth texture, conſiderably heavy, and very little irregular in ſhape, tho' differing much in ſize. It is always found in an oblong form, and uſually flatted, and rounded at the ends. Its moſt frequent ſize is four inches in length, two in breadth, and about one in thickneſs; and this very equally in all parts, not becoming either narrower or thinner at the ends. It is found, however, down to half an inch long, and ſometimes arriving at nine or ten inches. It is very ſoft, ſmooth, and unctuous to the touch, feeling like ſome of the finer Boles, and adhering firmly to the tongue. It is naturally of a very ſmooth and equal ſurface, tho' ſometimes irregularly protuberant in ſome places; it is but little harder than ſome of the finer clays when dry'd, and breaks with an irregular, but ſmooth ſurface.

Its inner ſtructure is truly admirable; it is all compos'd of matter of the ſame kind, conſiſtence and colour. Its Nucleus is a ſmall oblong maſs of the exact figure of the whole body, and like the reſt of a mix'd ferrugineous and earthy ſubſtance, and of a very agreeable browniſh-yellow; this is regularly ſurrounded with coats or cruſts, all of the ſame matter and colour; and thoſe ſo extreamly thin, that the zones of the fineſt oriental Sardonyxes do not exceed them in fineneſs. The thinneſt and fineſt paper, is a ſubſtance much too thick to compare them to. In a ſpecimen which I have of this, there may be counted more than eleven hundred of theſe cruſts, in the thickneſs of half an inch, yet they are regular and perfect, and all evenly encloſing the whole body.

This is the natural, and the moſt pure appearance of this ſpecies; but it is ſubject to ſome variations, from the taking up adventitious matter, and is found ſometimes with its cruſts thicker, and its whole ſubſtance coarſer. It has no inveſtient coat, but its outer cruſt is its natural ſurface. It has no ſparkling appearance, nor any degree of brightneſs, but appears merely of a clayey hue.

It will not give fire with ſteel.

It ferments very briſkly with Aqua Fortis.

It burns to a very beautiful pale red.

Examin'd by the Microſcope, it appears of an extreamly pure, fine, and even texture, and the regular diſtribution of its plates, is extreamly beautiful.

It is a very ſcarce Foſſil. I have ſeen it in ſome of the potter's clay-pits in Staffordſhire, and once or twice, met with it in the foreſt of Dean in Suſſex. This laſt ſummer I met with a very perfect and beautiful ſpecimen of it, in a brick clay-pit near Deptford-New-Croſs.

4. *Empherepyra mollior, cruſtis lucidis, fuſcis, & ſordide virentibus.*
Soft Empherepyra, with ſhining brown, and duſky green cruſts.

This is an extreamly ſingular and elegant body. It is in the greater part of a very coarſe and opake ſubſtance, and of a coarſe and lax texture. It is remarkably heavy, and is very determinate in ſhape and ſize, being always of an oblong form, and uſually of about an inch and half in length, yet in both reſpects it has its variations. It is moſt uſually of a ſimply oblong figure rounded, not at all compreſs'd or flatted, and a little ſmaller at the ends than in the middle, reſembling in ſome degree a nine-pin in figure; but it is ſometimes found with its ends as thick as its middle, or with one of them ſo; and ſometimes branch'd, having one, two, or more bodies of its own thickneſs, growing out from its ſides. It is alſo ſometimes found of not more than half an inch in length, and ſometimes, tho' very rarely, of five or ſix inches; and is uſually of ſomething leſs than half its length in diameter. It is conſiderably harſh and rough to the touch, and is of an extreamly rugged and unequal ſurface. It is but of little hardneſs, and breaks with an irregular, and ſomewhat rough ſurface. When broken tranſverſely,

verſely, its internal ſtructure is ſeen to be very beautiful. It is compos'd of three or four, and rarely more cruſts, ſurrounding a Nucleus of the ſame ſubſtance with themſelves. This Nucleus is of a deep, and very duſky and obſcure greeniſh colour, and is of the ſame ſhape with the whole body. This is ſurrounded by a broad cruſt of brown, that by another yet broader, of the ſame ſubſtance and colour with the Nucleus, and that by a very extraordinary and beautiful one, of a fine, pure and glittering appearance, and a very pale brown colour; this is uſually about a fourteenth of an inch in thickneſs, and might be miſtaken for a coat of Cryſtal or Spar by its look, but is really a regular congeries of oblong and ſmall Selenitæ, of one of the columnar kinds, rang'd perfectly evenly ſide by ſide, and forming a cruſt of perfectly regular ſhape and thickneſs; over theſe is a coat which is ever of a duſky brown Clay, of a coarſe ſort, with ſeveral ſmall Selenitæ immers'd alſo in it in various directions; this is always very rugged and unequal, and being the only part ſeen while the body is whole, gives it a very unpromiſing appearance; which has been the occaſion, I ſuppoſe, of its being hitherto over-look'd by the perſons who have made theſe things their ſtudy.

This is the common appearance of this ſingular and beautiful body, but it is ſubject, like the other ſpecies, to have its cruſts run into, and blend with one another, and then appears throughout one ſimple conſtructed lump; not ſo much as the Nucleus being diſtinguiſhable from the reſt, only the Selenitical cruſt always remains pure and diſtinguiſhable at firſt ſight.

It will not give fire with ſteel.

It ferments not at all with Aqua Fortis.

It burns to a looſe maſs, of a diſagreeable purpliſh red.

Examin'd by the Microſcope, it appears of a very coarſe, ſpungy and cavernous ſtructure, and perfectly opake in all parts; except its Selenitical cruſt, which is ſeen to be compos'd of oblong, flat and plated bodies, elegantly arrang'd, and is ever very bright, and in ſmall pieces tranſparent.

It is a very common Foſſil, tho' not obſerv'd; I remember to have ſeen it in many of the clay pits of Leiceſterſhire, Northamptonſhire and Staffordſhire, nor is it wanting about London. The fineſt ſpecimens I have of it having been collected in a clay pit between London and Iſlington, behind the place they call Black-Mary-hole, where they dig clay for the brewers.

5. *Empherepyra mollior, cruſtis lucidis, albidis, flavis & rubentibus.*

Soft Empherepyra, with lucid, whitiſh, yellowiſh and red cruſts.

This is a ſubſtance not at all inferior to the former in beauty, and of a much more pleaſing variety of colours. It is of a looſe and friable texture, and but moderately heavy. It is very regular and determinate in ſize and figure, being uſually an oblong body, rounded at the ends, and of about the ſize of a pigeon's egg. It is, however, ſometimes very long and ſlender, ſometimes almoſt regularly orbicular, and from half an inch to four inches in length in the longer ſpecimens, and to near three inches in diameter in the ſhorter and more round ones. It is very rough, but not harſh, or cutting to the touch, and is of a rude and uneven ſurface. It is but of little hardneſs, pretty readily breaking with a ſmall blow. It is compos'd of four, five, or ſix cruſts, ſeldom more; theſe are all much of the ſame degree of hardneſs, and of the ſame lax texture, but are very various in colour, ſome being whitiſh or grey, others yellowiſh, others of a very fine red, and always one of a ſparkling hue, and compos'd of the matter of the common Selenitæ. The Nucleus is of the matter of indifferently any one of theſe cruſts, uſually it is whitiſh, and ſometimes it is made of a blended mixture of the white and the yellowiſh, and then gives the appearance of a pale browniſh yellow: This is exactly of the ſame ſhape with the whole maſs, and the cruſts ſurround it in an alternate order, tho' not always regularly ſo: The inner cruſt which immediately ſurrounds the Nucleus is uſually yellow, the next red, beyond that there uſually is a whitiſh one, then a yellow again, and over theſe the outer one, which is ever compos'd of a regular arrangement of great numbers of ſmall columnar Selenitæ, which together form a cruſt, looking like a circle of Cryſtal. This is the general order and diſpoſition of the matter in this ſpecies; but very frequently the cruſts run into one another, and by this means the whitiſh one is frequently obliterated, and ſeems wanting. Over the ſelenitical coat there is always one of a coarſe clay; this is very crumbly, and often of a duſky yellowiſh brown, and has in it numbers of looſe Selenitæ, as there alſo not unfrequently are among the very cruſts of the body.

It will not give fire with ſteel.

It ferments not at all with Aqua Fortis.

In the fire it changes to a duſky-red brick colour, only the ſelenitical cruſt becomes white and opake, as in the other kind when burnt.

Examin'd by the Microſcope, it appears of a very lax, ſpungy and cavernous texture, and even in the moſt regular ſpecimens, the matter of the ſeveral cruſts is ſeen running among one another.

It is found in great abundance in the clay pits of Northamptonſhire, and I have met with it in Staffordſhire, Leiceſterſhire and Yorkſhire.

SERIES II.

CLASS II. ORDER I. GENUS II.

HETEROPYRÆ.

Siderochita, or cruſtated ferrugineous bodies, compos'd of ſeveral coats, incloſing a Nucleus of a different ſubſtance from themſelves, and often looſe, and rattling in them.

1. *Heteropyra durior, cruſtis fuſcis & purpureſcentibus, Nucleo albido-virente.*

Hard Heteropyra, with brown and purpliſh cruſts, and a whitiſh-green Nucleus.

THIS is a very beautiful Foſſil, and is one of thoſe bodies called by Dr. Woodward the Ochreo-ferrugineous Eagle Stones; and has ſo much of the character of the flinty Eagly Stone, as to be commonly ſold in the ſhops of Germany under that name.

It is of a very ſmooth and equal texture, and conſiderably compact and cloſe; and wou'd, were it ſolid, be conſiderably heavy, but it is ſo very hollow and empty, as to ſeem light in the maſs. It is in general very determinate and regular in ſhape and ſize, tho' like the reſt of the bodies of this Claſs it is ſometimes found ſubject to very great variations in both.

Its moſt frequent appearance is in form of an oblong oval figure, of about an inch in length, and half an inch in diameter, and in this ſtate it is ſeldom much flatted, and never goes off tapering to a point, but is rounded at both ends; in this ſtate it is very hollow, and in great part empty, being in reality no more than a very firm cruſt, including a ſmall quantity of a greeniſh white earth, amaſs'd into a lump in form of a Nucleus, ſometimes in one lump, ſometimes in two or three, but not enough in quantity to fill a third part of the ſpace within, for which reaſon it rattles, when ſhaken in the manner of the Eagle Stone, but with a fainter noiſe.

This is the uſual appearance of the body, but it is ſometimes found much ſmaller, and at times, tho' that more rarely, conſiderably larger in the ſame ſtate; but it is often alſo compreſs'd and flatted, and very frequently of an oblong form, with four inches length to one in breadth, and about a third of an inch in thickneſs; in theſe ſtates it cannot rattle, and ceaſes to reſemble an Eagle Stone. The matter of its Nucleus being preſs'd together into a looſe maſs, filling a much larger part, if not the whole of the vacuity: in which ever of their ſtates it is found; it is, however, always of the ſame ſubſtance and order of conſtruction. It is of a tolerably even ſurface, ſmooth and ſomewhat gloſſy, of a pale brown, with a faint mixture of a reddiſh yellow, and very ſoft to the touch. It is moderately hard, and breaks with an irregular ſurface, and is ſeen to be a cruſtated body, compos'd only of two coats, and ever encloſing a Nucleus, of a ſubſtance very different from them, yet ever the ſame in all ſpecimens; this is a very fine pale whitiſh green earth, ſoft and friable, very ſmooth to the touch, and readily melting like butter in the mouth. The two coats which encloſe this are always conſiderably thick, and very firm; they are uſually of equal thickneſs, and are in the ſpecimens of different ſize, from a ſixteenth to an eighth of an inch each; the inner one is always of a deep duſky purple; the outer of a brown, with an admixture of a yellowiſh red; theſe have both a ſomewhat ſparkling appearance when cloſely examin'd.

It will not give fire with ſteel.

It will not ferment with Aqua Fortis.

It burns to a purpliſh red.

Examin'd by the Microſcope, it appears of a very ſparkling brightneſs in the inner cruſt, but much leſs ſo in the outer; the Nucleus appears an Earth of a very fine texture, and does not at all ferment with Acids.

It is very common in the oval ſtate, with the looſe Nucleus in many parts of the German dominions. I have alſo met with it in the ſame ſtate on Mendip Hills, and have received it very fair from Mr. Simon of Dublin; but its more uſual appearance with us is in its compreſs'd form, and generally in the longer ſpecimens: I have met with it in this ſtate in the clay pits of Staffordſhire and Yorkſhire, and have received it from Mr. Da Coſta, collected by that great patron of theſe ſtudies, the Lord Biſhop of Exeter, near Cheltenham in Glouceſterſhire.

2. *Heteropyra ſcabra, purpuraſcens.*
Rough, purpliſh Heteropyra.

This is a very ſingular ſpecies of theſe bodies. It is of a cloſe ſtructure, and of no great weight, being no more than a ſingle, and that but thin cruſt, containing a large Nucleus of a very light earth. It is very determinate in ſize and ſhape, being uſually of a figure approaching to round, and in ſize of about half an inch in diameter: It is, however, ſometimes found much larger, and is often flatted, and ſometimes of an oblong form, tho' that very rarely. It is extreamly ſcabrous and rough to the touch, and of a ſtrangely rugged ſurface: this, however, is in a great meaſure owing to accident: Its natural ſurface is of a fine ſmall, but very harſh chagrining, being made up of ſmall tubercles, but having been form'd in the neighbourhood of arenaceous matter; particles of Sand are always found embodied in it, and affix'd to it exactly as the ſmall pebbles to ſome of the larger and coarſer of the Empherepyræ and Geodes; theſe make the ſurface very irregularly protuberant and harſh, and are very firmly affix'd in it. It has no inveſtient coat over this, and when broken appears to be compos'd of only this ſingle cruſt, which is of a ſomewhat coarſe texture, conſiderably bright and ſparkling, and uſually of about an eighteenth of an inch in thickneſs; ſometimes, however, it is thicker, and ſometimes made up of two or three others, but all of the ſame ſubſtance, yet theſe are rare varieties; within this ſhell is enclos'd a Nucleus of a very different matter, a pale or whitiſh earth, with a ſlight caſt of greeniſhneſs, very friable, ſoft to the touch, melting eaſily in the mouth, and not fermenting with Aqua Fortis. This is ſometimes found moulder'd away into powder, but often it is in concreted ſmall lumps, and will rattle in the cruſts when ſhaken.

The cruſt will not give fire with ſteel.

It will not ferment with Aqua Fortis.

It burns to a deep chocolate colour.

Examin'd by the Microſcope, it is ſeen to be of a ſpungy looſe ſtructure, but full of ſhining particles.

It is found in many parts of Italy, and has been met with in Germany, but there very rarely. It uſually lies at a ſmall depth among gravel.

3. *Heteropyra informis, cruſtis ferrugineis, rubris & ſordide, flaveſcentibus, Nucleo albo-virente.*

Miſ-ſhapen Heteropyra, with ferrugineous, red and duſky yellow cruſts, and a greeniſh-white Nucleus.

This is one of the moſt irregular and variouſly ſhap'd bodies of this claſs. But is of an extreamly firm, compact texture, and very heavy. It is very undeterminate in ſhape and ſize, but is uſually conſiderably large. Its Nucleus is a very hard and firm greeniſh white earth, ſoft to the touch, readily melting in the mouth, but ſcarce at all adhering to the tongue; this is of various ſhapes, but its moſt frequent figure is a very irregular oblong; large at one end, and tapering to the other, and very uneven on the ſides, having ſeveral protuberances and ſinkings; the matter of the ſeveral cruſts perfectly conforms itſelf to the figure of this Nucleus; they are uſually five or ſix in number, and are cover'd with a thick external coat of a coarſe clayey matter, containing a large quantity of Sand; this is of an extreamly rough and irregular ſurface, and of a lax friable texture; the cruſts are extreamly firm, and hard, and are not eaſily broken; they are ſomewhat bright and ſparkling, and are ſome of a perfect iron colour, and even in conſiſtence as well as colour reſemble iron that has been forg'd; others are of a duſky yellow, and others of a very beautiful red, but both theſe latter kinds are thinly interſpers'd, and often in great part blended with the ferrugineous; ſo that the whole appears a ſeries of ferrugineous cruſts of different degrees of colour, with only here and there a ſtreak of yellowiſh, and a coat of red juſt appearing on the ſurfaces of one or two of the common cruſts; very often there are alſo great irregularities attending this body; the matter deſtin'd to have form'd its cruſts, having been added in too large a quantity, and run from the body of the maſs into irregular veins to a great diſtance among the ſtrata of loam, or other earth, in which it was form'd; and this having happen'd while that ſtratum was yet moiſt, many times theſe abundant cruſts are found returning toward the body they were propagated from, and encloſing a quantity of the matter of the ſtratum, and making a ſort of baſtard Siderochitum.

It will not give fire with ſteel.

It will not ferment with Aqua Fortis.

It burns to a deep purple.

Examin'd by the Microſcope, its ferrugineous cruſts appear of a much more compact and even ſtructure than thoſe of any other body of this kind.

It is very common in many parts of England, where there are iron ores. I remember to have ſeen much of it in Suſſex, and in the foreſt of Dean in Glouceſterſhire; but we have it alſo in the neighbourhood of London, particularly about Woolwich in great abundance.

4. *Heteropyra cruſtis flavicantibus fuſcis, & nigreſcentibus, Nucleo albido fuſco.*

Yellow, brown, and black cruſted Heteropyra, with a whitiſh Nucleus.

This is an extreamly elegant and beautiful body, and is conſiderably firm, of a cloſe compact texture, and very heavy; it is ſomewhat determinate in ſhape, being almoſt always of an oblong form, very thick, and of a rough, uneven ſurface, and uſually very large; its moſt frequent ſtandard is about four inches in length, three inches in breadth, and two and a half in thickneſs; it never goes off tapering to the ends, but is nearly of the ſame breadth all the way, and tho' uſually a little flatted, is ſcarce ever much ſo; this is its moſt general appearance, but, like the other bodies of this kind, it is ſubject to its varieties; it has no inveſtient coat, but its ſurface is ever made up of its own outer cruſts, which are uſually broken and irregular, and give it a very uneven and rugged appearance; it is, however, conſiderably ſmooth and ſoft to the touch, and is of great hardneſs; when broken it is ſeen to be of a moſt elegant ſtructure; its central Nucleus is of a very different matter from the reſt, a pale whitiſh earth, with a faint caſt of brown, conſiderably hard, eaſily melting in the mouth, and ſlightly adhering to the tongue: this is uſually of a conic figure, broad at the baſe, and tapering to a point at the top, and is not perfectly rounded, but has uſually two or three ridges;

the cruſts all exactly conform to the ſhape of this body, but they are much thicker in that part of the body, which is form'd upon its narrower part, than in that which is form'd upon its baſe: theſe are all of the ſame ſtructure and hardneſs, all very firm, compact, and cloſe, but of different colours; ſome yellow, others of a pale brown, and others black; they are of different thickneſſes, from a tenth part of an inch to the thinneſs of the fineſt paper, and are laid in a very beautiful, tho' not perfectly regular alternate order, ſo that there are uſually a large number of them; the ſpecimen I preſerve has thirty-two of them in the ſemi-diameter, which is not much more than an inch.

It will not give fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a pale brick colour.

Examin'd by the Microſcope, it appears an extreamly beautiful object; it is throughout of a fine and even texture, and its cruſts are nicely and exactly join'd to one another.

It is found in ſeveral parts of the Britiſh dominions; I have met with it in Leiceſterſhire, and in Suſſex: that accurate and curious naturaliſt Mr. Simon of Dublin, has alſo ſent it me from the county of Wicklow in Ireland; but the fineſt ſpecimens I have ever ſeen of it I receiv'd from Mr. Knowlton of Yorkſhire.

5. *Heteropyra cruſtis flavis, ferrugineis, & purpureo rubentibus, Nucleo pallide flavicanti.*

Yellow, ferrugineous, and purpliſh cruſted Heteropyra, with a pale-yellow Nucleus.

This is another extreamly ſingular and elegant body; it is of a very firm and compact texture, and equal to many of the Stones of ſtrata in hardneſs; it is very remarkably heavy, and appears almoſt throughout of a fine purpliſh red; it is very indeterminate in ſhape and ſize, but is uſually found large, oblong, and of a ſomewhat flatted form; it is cover'd with no inveſtient coat, but its outer cruſt makes its ſurface, which is commonly tolerably ſmooth and even, and always conſiderably ſoft and ſmooth to the touch; its moſt uſual ſtandard is from four to twelve inches in length, with about a third of its length in breadth, and nearly the ſame in thickneſs; its outer figure not all reſembling the ſhape of the Nucleus it is form'd on, from the abundant quantity of matter added for the formation of its outer cruſts.

Its Nucleus is ever either orbicular or oval, or a part of ſuch a figure, the half of a round maſs ſtanding on a flat baſis, as if cut in two, often ſerving as a Nucleus to the largeſt maſſes; the Nucleus is ever of a matter, and that very different from that of the cruſts, being a very light and fine, yet conſiderably hard, pale yellow earth; this is very ſmall in proportion to the body, one of an inch in diameter, often ſerving for the baſis of a maſs of ten inches; it is ſometimes unequal on the ſurface, but never runs to a point, and is of an aſtringent taſte, and adheres very firmly to the tongue; the maſs is very difficultly broken, but when ſeparated, this Nucleus is found ſometimes exactly in the center, ſometimes very far to one ſide, or near one end, and is ſurrounded by four or five thin cruſts of yellow, and a ferrugineous brown, and theſe by one or more extreamly thick ones, of a fine glowing purpliſh red; ſometimes a ſingle cruſt of this is extended irregularly from this baſis into a very large maſs; ſometimes ſeveral concur to the forming this, and theſe are in ſome ſpecimens laid evenly on one another, without any intermediate ſubſtance, and in others they are ſeparated by thin coats of the brown.

It breaks with a very ſmooth and even, but not at all gloſſy ſurface.

It will not give fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a very deep purple.

Examin'd by the Microſcope, it appears throughout of a very beautiful, regular, cloſe, and compact texture; but its red part is ever finer and cloſer than the reſt.

It is a very rare Foſſil; I have never ſeen it except in Yorkſhire, where I collected ſome years ſince ſeveral good ſpecimens, but have ſince receiv'd much finer from the ingenious Mr. Knowlton: there is one very ſingular accident which ſometimes attends the larger ſpecimens of this Foſſil, which is, that the red part is often vein'd with thin ſtreaks of a fine white Spar, diſpos'd in ſome degree in the manner of the Septa in the Septariæ; this readily ferments with Acids, tho' no other part of the body does ſo: the red part of this Foſſil is very rich in iron.

6. *Heteropyra impurior, cruſtis flavis, & fuſco ferrugineis, Nucleo fuſco flaveſcente.*

Coarſe, yellow and brown cruſted Heteropyra, with a browniſh-yellow Nucleus.

This is a ſpecies extreamly inferior to all the precedent in beauty and purity, but has this remarkable property, that it very frequently has its Nucleus ſo looſe in it as to be a very perfect ferrugineous Ætites or Eagle Stone.

It is of a very coarſe and impure texture, and conſiderably heavy, but of very little hardneſs; it is not very irregular in ſhape and ſize, being uſually found approaching to an orbicular or oval form, and between one inch and two in diameter; it is ſometimes conſiderably long, and not unfrequently a little flatted, and is uſually of a very unequal and rugged ſurface, and ſeldom tolerably regular in its roundneſs; it has no other inveſtient coat than its own outer cruſt, but this is uſually foul'd with the matter of the ſtratum in which it has been form'd, and is rough, duſty, and harſh to the touch; it breaks with a ſmall blow, and is then ſeen to be a conſiderably thick ſhell, compos'd of two, three, or four cruſts, and encloſing a hard and ſolid Nucleus, which ſeldom perfectly fills it, and frequently is ſo looſe as to rattle in it on ſhaking: this Nucleus is an indurated earth, of a duſky browniſh-yellow colour, and the ſhell is compos'd of cruſts alternately of a coarſe yellow, and a duſky ferrugineous brown, the brown ones being uſually the thickeſt, and making the much larger part of the maſs; it breaks with a very rough and rugged ſurface, and in the brown parts is a little ſparkling, in the yellow not at all ſo.

It will not give fire with ſteel.

It will not ferment with Aqua Fortis.

It burns throughout to a duſky purple.

Examin'd by the Microſcope, it appears in all parts of a conſiderably impure and lax texture, but much more ſo in the yellow than in the brown.

It is common in the clay-pits of Suſſex, and of Leiceſterſhire; I have alſo found many very fair ſpecimens of it in the clay-pit on the ſides of the hill near Harrow.

7. *Heteropyra impurior, cruſtis fuſcis, nigris & aurantiis, Nucleo flavo.*

Coarſe Heteropyra, with brown, black, and orange-colour'd cruſts, and a yellow Nucleus.

This is the moſt impure and coarſe body of this whole claſs; it is of a very lax ſpungy texture, of very little hardneſs, and but moderately heavy; it is not very irregular either in ſhape or ſize, being always found of an oblong form, and uſually of about an inch and half in length; it has great variations, however, in the formation of the ſeveral maſſes, ſome being pretty regularly oval, others very long in proportion to their thickneſs, and others bent, twiſted or otherwiſe contorted, and ſome conſiderably flatted; its ſurface is generally tolerably equal, tho' ſometimes not a little rugged; and even in the moſt regular ſpecimens is very rough to the touch, and of a ſpungy, cavernous, and very coarſe ſtructure; it has uſually about half its length in diameter when rounded, and when flatted has proportionably a greater breadth, tho' leſs thickneſs; it has but very little hardneſs, and breaks with a ſlight blow, and is then ſeen to be compos'd of a large Nucleus, cloſely ſurrounded by a moderately thick ſhell, and filling up its whole cavity: the Nucleus is a coarſe indurated earth, of the Loam kind, containing a large proportion of ſand, and is of a pale but agreeable yellow; the ſhell is exactly of the ſame ſhape with this, and uſually ſurrounds it in every part with equal thickneſs; it is compos'd of ſix or ſeven cruſts in the moſt perfect ſpecimens, which are alternately of a duſky brown, a reddiſh yellow, or orange colour, and a purpliſh black, all tho' coarſe in themſelves, yet much finer than the matter of the Nucleus: this is the moſt perfect ſtate of this body, but it is frequently found with only two or three cruſts of leſs determinate colours, and ſometimes with only one broad one ſurrounding the Nucleus: theſe varieties are owing to the matter of the ſeveral cruſts having blended together.

It will not give fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a purpliſh red.

Examin'd by the Microſcope, it appears a very coarſe maſs, compos'd of ferrugineous matter, but very imperfectly mixt with particles of ſand.

It is found in great plenty in the largeſt ſand pit on Hampſtead Heath, and in many other parts of England.

SERIES II.

Class II. Order II. Genus I.

GEODES.

Siderochita, or cruſtated ferrugineous bodies, form'd into large, and in great part empty caſes, encloſing a ſmall quantity of earthy, or arenaceous matter.

1. *Geodes rimoſa, cruſtis ferrugineis, fuſcis, & flavicantibus.* *Crack'd Geodes, with ferrugineous, brown, and yellow cruſts.*

THIS is a very fine and ſingular Foſſil; it is of a conſiderably firm texture, very hard, and of great weight, tho' always hollow, and in great part empty; it is very regular in ſhape, being ever of an oblong figure, uſually ſomething larger in the middle than at the ends, but not much ſo, and always much flatted or compreſs'd; it is various in ſize, being uſually found of about two inches in length, and an inch and quarter in breadth, with three quarters of an inch in thickneſs, but is ſometimes ſeen of leſs than half an inch long, and at times of four or five inches; it has no inveſtient coat, but its own outer cruſt, which is of a yellow colour, with ſome variegations of a reddiſh brown, and is naturally ſmooth to the touch, but ſometimes becomes very ſcabrous and rough, from the particles of ſand having been bedded in it while not yet harden'd; there is, however, this alſo ſingular in this ſpecies, and which at firſt ſight diſtinguiſhes it from all others, it is all over crack'd, and cut in in different directions, and theſe cracks are not ſlight or ſuperficial, but look like the deep cracks in clayey earth in dry weather, and are ſo deep that one cannot but wonder how the body hangs together without falling to pieces at them.

It is very hard, and will not break but with a ſtrong blow, when broken it is found to be a caſe containing only a ſmall quantity of a yellow ochreous earth, with a ſlight admixture of ſand, and ſometimes of ſand, or of ochre alone, its greater part remaining empty; this caſe is found alſo to be very uneven within, and full of numerous riſings and cavities, and is compos'd uſually of only three cruſts, the innermoſt of a fine pure ferrugineous matter, of a bluei ſh-black colour, and ſomewhat gloſſy, the middle one of a deep brown, with a ſmaller proportion of iron, and the outer one of a fair yellow, with yet leſs, but with ſome variegations of brown; this, however, is not certain, but there are ſometimes four or five cruſts, and ſometimes the whole matter has run together in ſuch a manner as to make but one of a mix'd colour.

It will not give fire with ſteel.

It ferments not at all with Aqua Fortis.

It burns to a deep purpliſh red.

Examin'd by the Microſcope, it appears very pure and beautiful, but much finer and darker colour'd in ſome parts than in others, the others are leſs regular in their texture, but all very fine.

It is found among gravel; I have met with ſome fair ſpecimens of it about Northampton, and in the neighbourhood of Windſor, but the fineſt I have ever ſeen I pick'd up in the great gravel-pit near Tyburn.

The neighbourhood of London, is indeed famous for producing for producing almoſt all the Siderochita in great abundance.

2. *Geodes rugoſa, cruſtis ferrugineis, fuſco rubentibus & aureis. Wrinkled Geodes, with ferrugineous reddiſh brown, and gold yellow cruſts.*

This is another very ſingular and elegant body. It is of a conſiderably compact and firm texture, moderately hard, and of very great weight, when the pieces of the cruſts are examined; but in the compleat maſs it is very light, being a large hollow caſe, and almoſt wholly empty. It is uſually of an irregular oblong form, rudely approaching to an oval, but full of prominences and ſinuoſities, and often conſiderably flatted. Its moſt uſual ſize is about three inches in length, and two and a half in diameter; but it is ſometimes found ſo ſmall as of half an inch in length, and ſometimes, tho' rarely, of ſix or eight inches, and is not free from thoſe irregularities in its figure, to which the other bodies of this claſs are ſubject. It has no other inveſtient coat but its own outer cruſt, which is ſomewhat rough and rugged to the touch, and duſts the fingers in handling. It is in colour of a fine gold yellow, with a faint admixture of a browniſh red, and is very oddly wrinkled, being ſubject to innumerable ſuperficial cracks, which ſeparate its ſubſtance into numerous irregular lumps, of the ſize of a ſmall pea, the cracks between them being either empty, or fill'd up with adventitious matter from among the ſtrata it was form'd in. This is its moſt perfect ſtate, but it is ſeldom found thus, being more uſually worn ſmooth by external agents, and ſo irregularly rub'd down by them, as to ſhew in many parts its fine cruſtaceous ſtructure.

It requires a ſmart blow to break it, and is found to be a thin caſe almoſt entirely empty, uſually divided into ſeveral cells, by diviſions of one or two of its cruſts, and containing a ſmall quantity of looſe ochreous earth, of a fine bright yellow. The ſhell of this caſe is, when in its moſt perfect ſtate, compos'd of almoſt innumerable cruſts; ſome of a ferrugineous colour, but not ſo dark or blackiſh as in many other of theſe bodies; others of a reddiſh-brown, and others of a fine gold-yellow. The ferrugineous cruſts are uſually thick, and make the inner ſurface of the caſe; the others are extreamly thin, and are plac'd in vaſt numbers in an alternate order over it. The uſual thickneſs of this ſhell is leſs than a third of an inch, and the ferrugineous matter takes up the greater part of it; yet it is not unfrequent to ſee forty of theſe thin cruſts go to make up the reſt of the thickneſs. It is rare, however, to find this ſpecies ſo perfect as this; very frequently the whole ſhell is thinner, and made up only of two cruſts, the whole number of reddiſh and yellow ones having blended together, and making only one or two of a mixt colour between their own.

It will not give fire with ſteel.

It will not ferment with Aqua Fortis.

It burns to a purpliſh red.

Examin'd by the Microſcope, it appears of a fine, cloſe, even, and beautiful ſtructure; and its ferrugineous part very compact and firm.

It is found in ſome parts of Oxfordſhire and Yorkſhire, but the moſt perfect ſpecimens I have ever met with, are what I found this laſt ſummer in a gravel-pit, on the right hand ſide of the Oxford road, about a mile beyond Tyburn.

3. *Geodes ſcintillans, cruſtis ferrugineis, purpuraſcentibus, & aurantiis. Sparkling Geodes, with ferrugineous, purpliſh and orange colour'd cruſts.*

This is one of the moſt uncertain Foſſils of this claſs, and the moſt ſubject to variation in its figure, but it ever retains the ſame general internal ſtructure. It is a very firm and compact body, yet is but of a coarſe texture; and is very hard and of great weight. It is of numerous odly varied figures, but is uſually oblong and flatted in them all. Sometimes it is full of protuberances, ſometimes branch'd, and ſometimes tapering to one or both ends, but this more rarely. It has no inveſtient coat but its own outer cruſt, but with this it makes a very rude and rough figure; having been uſually either form'd among gravel, or elſe lodg'd among it while yet moiſt and ſoft; and having thence its ſides all cover'd with pebbles of different ſizes, ſome very large, and generally carrying the impreſſions whence many more have fallen off; which have penetrated ſo far, that ſometimes there is found a hole quite into the body; but always the ſeveral upper cruſts are ſeen in the impreſſion. Its uſual ſize is about four inches in length, two in breadth, and from half an inch to an inch and half in thickneſs; but it is found from half an inch long to twelve inches. It is very rough and harſh to the touch, and requires a hard blow to break it. When broken, it is found to be a caſe more or leſs fill'd with foreign matter, but that of no determinate kind; ſometimes ſand, ſometimes an ochreous, and ſometimes a loamy earth; and ſometimes, tho' rarely, the matter of the common vitriolic Pyrites. The ſhell of this caſe is compos'd of eight or ten cruſts, all of a bright ſparkling appearance; ſome are of a deep ferrugineous dye, others of a duſky purple, and others of a ſort of ſaffron colour, or orange colour; theſe are uſually laid pretty regularly in an alternate order, but they often intrench upon one another, and are ſometimes found blended together, and making only one or two thick cruſts.

It will not give fire with ſteel.

It will not ferment with Aqua Fortis.

It ſuffers but little change of colour in the fire.

Examin'd by the Microſcope, it appears of a coarſe and ſomewhat ſpungy texture; and many parts of the ferrugineous cruſts look like melted iron. It is found in the gravel pits in many parts of England, but no where ſo plentifully as in thoſe on Hampſtead-Heath, near the town.

4. *Geodes oblonga, ſcabra, cruſta purpuro-ferruginea ſingulari.*
Long ſcabrous Geodes, with a ſingle purpliſh cruſt.

There are many of theſe cruſtated ferrugineous bodies which uſually appear in an oblong form; but this never is found otherwiſe, and is a very ſingular ſpecies. It is of a very firm ſubſtance and cloſe compact texture, conſiderably heavy and very hard. It is ever found in a long and ſlender form, and uſually a little compreſs'd. It has no other inveſtient coat but its own cruſt; which, however, has generally incorporated near its ſurface, a large quantity of the matter of the ſtratum in which it was form'd, and appears of a yellowiſh colour. It is uſually of about four inches in length, and three quarters of an inch in diameter, and is of a ſtrangely rugged and unequal ſurface, riſing up into a number of long, irregular protuberances. It requires a ſmart blow to break it, and when broken is found to be a ſhell of this form, encloſing a yellow ochreous earth with an admixture of ſand, and with which it is nearly full. It is compos'd only of one cruſt, and that not very thick; and of a mix'd purpliſh ferrugineous colour, and ſomewhat ſparkling.

It will not give fire with ſteel.

It will not ferment with Aqua Fortis.

It burns to a deep and fine purple.

It is a rare Foſſil. I never remember to have met with it more than twice; once on Mendip-Hills, and the other time in the clay-pit on the ſide of the hill near Harrow, and in neither of theſe places in any great plenty.

5. *Geodes oblonga, cruſta ferugineo nigra, ſingulari.*
Long Geodes, with a ſingle blackiſh cruſt.

This is a very ſingular and elegant Foſſil. It is moderately firm and compact, and of a conſiderably cloſe texture, moderately heavy and not very hard.

It is always of an oblong, but very irregular form, being frequently twiſted and contorted, and of very different thickneſſes in the different parts of the ſame maſs, and is uſually a little compreſs'd, but ſeldom much ſo; it has no other inveſtient coat than its own cruſt, which is generally, however, ſo much loaded with the Earth of the ſtratum it was form'd in as to appear of a browniſh yellow. It is moſt frequently found of about two inches in length, and three quarters of an inch in breadth, and more than half an inch in thickneſs; but it varies much from this ſize, being frequently found much ſmaller, and often conſiderably large. It is of an uneven ſurface, full of irregular prominences and cavities, and is very rough to the touch, ſtaining the hands a little, and throwing off uſually ſome grains of ſand. It is broke with a ſmall blow, and when broken is ſeen to be a very beautiful body, being a ſhell of this form, conſiſting of a ſingle tolerably thick cruſt, of a blackiſh colour, and ſomewhat faintly ſparkling appearance, and fill'd with a very fine bright red earth, ſometimes pure, and at others mix'd with yellowiſh or whitiſh loam.

It will not give fire with ſteel.

It will not ferment with Aqua Fortis.

It burns to a fine deep purple.

Examin'd by the Microſcope, the earth appears to be a very coarſe and lax ſandy Marle, and the cruſt conſiderably firm and bright; the inſide of the cruſt is uſually deeply ſtain'd with the red of the earth within, and ſometimes a part of that earth adheres ſo cloſely to it, as to give the appearance of a red cruſt within the blackiſh one.

It is a very rare Foſſil, I remember it only on Mendip Hills in Somerſetſhire, whence I had the ſpecimens I preſerve: It lay at a ſmall depth among a yellow loam.

It is remarkable of the earths contain'd in the ferrugineous bodies, that they are none of them the earth of the ſtratum in which they are now found, which ſhou'd ſeem to infer, that they were form'd elſewhere, and afterwards lodg'd where we find them; yet this muſt have been done before they were thoroughly harden'd, for tho' what they contain within is different from the matter of the ſtratum, yet their external cruſt is uſually found foul'd with that very matter.

SERIES II.

CLASS II. ORDER II. GENUS II.

ENHYDRI.

Siderochita, or cruſtated ferrugineous bodies, form'd into large and in great part empty caſes, encloſing a ſmall quantity of an aqueous fluid.

1. *Enhydrus craſſior, cruſtis nigricantibus, fuſco-rubentibus, & flavis.* *Thick ſhell'd Enhydrus, with black, reddiſh brown, and yellow cruſts.*

This is a Foſſil of but mean external appearance, but is very remarkable for its contents. It is of a very cloſe, even and compact texture, conſiderably heavy, and very hard. It is very determinate and regular in its figure, being always of an irregularly rounded ſhape, but very flat, and uſually riſing up gradually toward the middle, and ſinking, and becoming thinner toward the edges. Its moſt common ſize is about four inches in diameter, and ſomewhat leſs than two in thickneſs in the middle or thickeſt part, but is found as ſmall as of the breadth of a ſhilling, and ſometimes of eight or ten inches over. It is of a rude, rugged and uneven ſurface, rough to the touch, and of a mixt yellow and browniſh red colour; its outer cruſt being uſually compos'd of the blended matter of its reddiſh and yellow ones, and debas'd by the earth in the ſtratum of which it has been form'd, or depoſited while yet moiſt; it is eaſily broken, and when this is carefully done, is found to be a very thick ſhell or caſe, in great part empty, but containing a quantity of an aqueous fluid; this is uſually ſomewhat thick, and is ſometimes found foul'd with an ochreous earth, ſometimes wholly free from it, and is then, if pure, of a blueiſh white, perfectly inſipid to the taſte, and of no ſmell; it is, however, more frequently found ting'd yellowiſh, reddiſh or black, and in the laſt caſe has ſomewhat of a ferrugineous taſte.

The ſhell in which this is contain'd is uſually compos'd of three very thick cruſts, the inner one of a blackiſh hue, and ſhining; the middle one of a duſky browniſh red, and the outer one of a fair yellow, but toward its ſurface blended with an admixture of the brown, and with other foreign matter; the inner and outer cruſts are uſually the thickeſt; the middle one thinner, but this is not conſtantly the caſe; they are at times found one thickeſt as well as another, often they are alſo blended together, and ſometimes the black, ſometimes the red is the innermoſt, and often there

SIDEROCHITA.

Plate. 4

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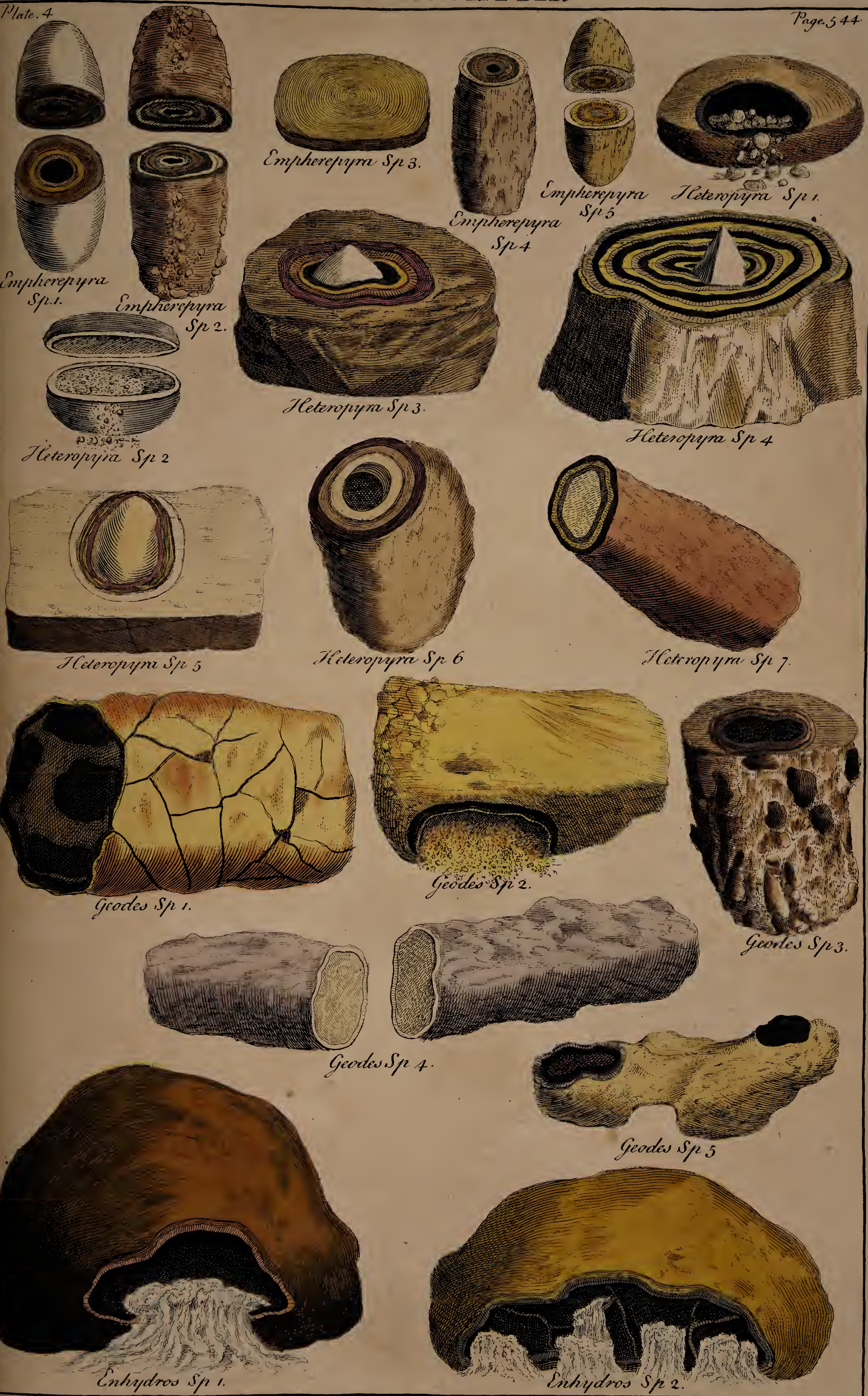
Empherepyra Sp. 1.
Empherepyra Sp 2.
Empherepyra Sp 3.
Empherepyra Sp 4
Empherepyra Sp 5
Heteropyra Sp 1.
Heteropyra Sp 2
Heteropyra Sp 3.
Heteropyra Sp 4
Heteropyra Sp 5
Heteropyra Sp 6
Heteropyra Sp 7.
Geodes Sp 1.
Geodes Sp 2.
Geodes Sp 3.
Geodes Sp 4.
Geodes Sp 5
Enhydros Sp 1.
Enhydros Sp 2.

T. Cole sculp.

are ſeven, eight or nine of them inſtead of three; they are, however, ever of the ſame nature and ſtructure, and of the ſame colours; the cavity in this ſpecies is large, and is never divided into different cells, ſo far as I have yet obſerv'd. The black cruſt is of a very fine, firm, and compact texture; the reddiſh brown is ſomething leſs ſo than this, and the yellow one the coarſeſt of all.

It will not give fire with ſteel.

It ferments not with Aqua Fortis.

It burns to a deep purple.

Examin'd by the Microſcope, the black cruſt ſeems more pure than in any other cruſtated ferrugineous bodies, but the yellow very coarſe.

It is ſometimes thrown up in digging on Mendip Hills, and I do not remember to have met with it in any other place; the ſpecimens I have, are of the common ſize, and lay at a ſmall depth.

2. *Enhydrus tenuior, cruſtis flavo-fuſcis & purpuraſcentibus.*
Thinner ſhell'd Enhydrus, with yellowiſh-brown and purpliſh cruſts.

This is an extreamly beautiful Foſſil, and carries ſomewhat very ſingular, even in its outer form. It is of a compact texture, conſiderably heavy, and very hard. It is of a determinate ſhape, being always of an irregularly oval figure, with many cavities and prominences on it, and often ſome odd ſhap'd extuberances, but it is always very high in the middle, ſcarce appearing at all flatted, and grows thinner as it approaches the ſides, and is uſually ſomewhat narrower at the ends than in the middle. Its ſize is very various, its uſual ſtandard is about three inches in length, and nearly as much both in breadth and thickneſs, but it is ſometimes found much ſmaller, and ſometimes a foot long. It is very rough to the touch, and a little ſtains the fingers in handling. It requires a conſiderable blow to break it, and if broken carefully, is found to be uſually more than half full of a whitiſh liquor, as thick as cream; this is ſometimes ting'd to other colours however, and ſometimes is of a brackiſh taſte, tho' naturally inſipid; the ſhell containing this is a thin coat, compos'd uſually of only two cruſts; the inner one of a fine deep purpliſh colour, and very compact and hard; the outer of a yellowiſh brown, and ſomewhat leſs ſo. This, however, is not the invariable ſtructure of the body, for ſometimes there are three, four or more cruſts; the inner cavity is uſually divided into three or four cells, by thin partitions of the matter of the inner cruſt, and is often of a rugoſe, cavernous or granulated ſurface, both at the top and bottom, and on theſe partitions.

It will not give fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a deep purple.

Examin'd by the Microſcope, the inner or purple cruſt appears very pure, and of a very firm texture, the outer one much leſs ſo.

It is found in clay pits, but is not common; I have ſeen it in the potters clay pits in Staffordſhire, and there are now and then ſome fine ſpecimens of it diſcover'd in the clay pit on the ſide of the hill at Harrow, which is a very rich repoſitory of the Foſſils of this Claſs.

FOSSILS

NATURALLY *and eſſentially compound, not inflammable, nor ſoluble in water.*

Series the third.

Thoſe form'd in detach'd maſſes, but of no determinate figure or regular ſtructure; and compos'd of a cryſtalline or ſparry matter, debas'd by an admixture of earth in various proportions.

Of this Series there are four Claſſes.

The firſt of the Scrupi. Foſſils of a variouſly debas'd cryſtalline or ſparry matter, found in large irregular maſſes without cruſts.

The ſecond of the ſemipellucid Gems. Foſſils of a leſs debas'd cryſtalline matter of great beauty and brightneſs; a moderate degree of tranſparence, and uſually found in ſmall maſſes.

The third of the Pebbles. Stones compos'd of a cryſtalline matter, variouſly debas'd by earth; found in ſmall maſſes, and uſually form'd by incruſtations of different colour'd matter round a central Nucleus, and cover'd with a cruſt.

The fourth of the Sands. Stones which are the ſmalleſt of all Foſſil bodies, compos'd of cryſtalline matter, ſlightly or not at all debas'd by earth; and found in vaſt ſtrata amaſs'd together in form of a looſe powder.

Series the third.

Claſs the firſt.

SCRUPI.

Foſſils form'd into large detach'd maſſes without cruſts, and compos'd of a variouſly debas'd cryſtalline matter.

Of this Claſs there are two Orders, and under thoſe four Genera.

Order the firſt.

Thoſe of a more rude and irregular ſtructure in the maſs.

Order the ſecond.

Thoſe of a more equal and regular conſtruction.

SCRUPI.

Order the firſt.

Genus 1. TELAUGIA. *Scrupi, of a glittering appearance, uſually containing flakes of Talc, and emulating the ſtructure of the Granites.*

Genus 2. LITHOZUGIA. *Scrupi compos'd of a ſimply ſtony matter, making a kind of cement, and holding firmly together ſmall pebbles, &c. embodied in it.*

SCRUPI.

Order the Second.

Genus 1. PETRIDIA. *Scrupi of a plain uniform ſtructure, of no great variety of colours, and emulating the form of pebbles.*

Genus 2. JASPIDES. *Scrupi of a complex irregular ſtructure, of great variety of colours, and emulating the appearance of the finer Marbles.*

SERIES III.

CLASS I. ORDER I. GENUS I.

TELAUGIA.

Scrupi of a glittering appearance, and emulating the texture of the Granites.

1. *Telaugium duriſſimum, albido nigreſcens.* *Hard, ſhining, black and white Telaugium.*

This is a Stone of a very great beauty, which we every day tread under our feet in the pavements of our ſtreets, without regarding its ſtructure or variegations. It is of a very rude, unequal and irregular ſtructure, but extreamly firm and compact, of a ſmooth and even, but not gloſſy ſurface, of very remarkable bigneſs, being not unfrequently found of eighteen, twenty, or twenty-five inches diameter, and of an irregular and uncertain ſhape, but moſt commonly tending to either round, oval, or flat. Its colours at a ſlight view ſeem only two, a dull yellowiſh white, and a gloſſy black; the former if any properly, the ground, the latter the variegation; more nearly examin'd however, this Stone ſhews a much greater variety. Its black and white are ſeen to be in ſome places both of them, of a flaky or plated texture, and very bright and gloſſy, in others of a uniform plain ſtructure, and more dull and dead. Its white ſpecks are alſo in ſome places ſeen ſlightly ting'd with a bluſh of fleſh colour; in others yellowiſh or cream colour'd, and in others perfectly colourleſs, and very near the true luſtre of pure Cryſtal. It is dull and dead on the ſurface, but very bright and ſparkling where freſh broken, and is of conſiderable weight, very hard, and capable of an elegant poliſh.

It readily ſtrikes fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It ſuffers very little change of colour in the fire.

Examin'd by the Microſcope, it exhibits a very various and pleaſing texture, the more bright and pellucid parts, and the more opake and yellowiſh ones, are both ſubject to a great variation of ſtructure, for they are ſometimes plain Cryſtal, more or leſs debas'd with Earth only, and plainly the ſame with the white veins of the Jaſpers; and in other places evidently mix'd with a foliaceous Talc in their original concretions; this has determin'd theſe to a kind of plated or foliaceous texture, and that according to the various quantities of Talc in the mixture; in ſome this texture is ſcarce at all diſcernible, in others plainly ſo, and in others the flakes appear almoſt pure Talc, tho' I never found any yet that were perfectly ſo, or had the perfect elaſticity, or other characters of that Foſſil when pure; I am aware, that this, which is a very well known ſubſtance among the ſtudents in theſe things, has been generally taken to conſiſt in a great meaſure of black and white flakes of Talc, but this is only one of the many proofs of the neceſſity of a ſtrict examination of theſe ſubſtances; if the Microſcope has enabled me to determine that this body contains no pure white Talc, much more will it bear me out in affirming that it contains no pure black; for the moſt bright and flaky of the black maſſes in it appear ſo far from being truly of that kind, that the Microſcope ſhews them, when nicely divided into thin pieces, to be a little, tho' very obſcurely tranſparent, and naturally to have been cryſtalline matter of a fine emerald green, but debas'd by a great quantity of earth, and having taken up in the different inſtances, more or leſs of a foliaceous Talc, to be differently determin'd by it according to its quantity, into a more or leſs tabulated ſtructure. It requires ſome care, accuracy and attention to examine theſe compound bodies by the Microſcope and other teſts, every black particle of this will be found one where or other a little greeniſh at the edges, when broke off from the reſt; but when nicely ſeparated they will be found pretty eaſily to ſplit in an horizontal direction, and if thus ſeparated into a maſs, reſembling a thin flake of Talc, will be found a fine green Cryſtal, with very little elaſticity, or of any other quality of Talc. It is plain, that the various ſmall Moleculæ, of which this body is compos'd, all concreted ſeparately in the once univerſal fluid, and took up into their own ſtructure, more or leſs of the yet floating particles of Earth, Talc, or whatever elſe that part of the fluid they concreted in abounded with; after their ſeveral coaleſcences, theſe Moleculæ fell together in the fluid, and concreting into this mixt maſs, ſuffer'd a ſhrinking together on the abſence of the water at their final and general coaleſcence, which has cruſh'd them into the various directions we ſee them mix'd in.

All Foſſil bodies form'd at this great period, ſhew the readineſs with which they received the extraneous matter, be it whatever which was contain'd in the then univerſal fluid, into their own ſtructure, and made it a part of themſelves; hence the uncertainty and impoſſibility of fixing any determinate characters of Foſſils, as of Vegetables and Animals, and hence we find gold in cryſtalline matter, iron in clay, and copper, and the other metals even in the hardeſt gems: Nothing ſeems to have been, however, ſo univerſally ſuſpended in this fluid, as a fine white ſubtil earth; this ſeems to have been almoſt univerſally taken up in Cryſtal, and to have made, as in the white parts of this Stone, and a thouſand other inſtances, what has been call'd erroneouſly Spar. This maſs on the whole then, notwithſtanding that it has generally been ſuppos'd to be made up of Talc and Spar, is on a more ſtrict examination found to contain no particle of pure Talc, nor the leaſt grain of Spar, even in admixture with its other matter, but to be a mere congeries, of a more or leſs talcy and earthy cryſtalline ſubſtance.

It is common on the ſhores of Guernſey Iſland, and is found in many places alſo on the Engliſh coaſt. It is brought in great quantities hither, and us'd in the pavements of our ſtreets.

2. *Telaugium duriſſimum, albo-rubeſcens.*
Hard, ſhining, red and white Telaugium.

This is a maſs in ſome degree reſembling the precedent in its texture and conſtitution, but of a much more pleaſing colour, and has leſs white, and no black Talc at all in it.

It is of a large, coarſe, and irregular texture, but very firm, compact and hard, of a very ſmooth, even and polite ſurface, of very conſiderable ſize, often twenty or thirty inches in diameter, and in ſhape generally tending to roundiſh or oval, tho' often very irregularly ſo, and commonly ſhewing, by a flatneſs on one ſide, what was its original bottom at its firſt ſubſidence. Its colour is a very pleaſing light red, often becoming pale, like a fleſh colour, and every where interſpers'd with Moleculæ, of a very pure and bright white; this Stone indeed as the former, and many others of this Claſs, is in reality compos'd entirely of ſuch Moleculæ, or ſmall parcels of matter, of from one eighth to one fourth of an inch diameter, as it were confuſedly jumbled and cruſh'd together. It is externally ſmooth and polite, and when broken, is of great brightneſs and beauty. It is extreamly ſmooth and heavy, and is very hard, and capable of an equal and very beautiful poliſh.

It very readily ſtrikes fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It ſuffers very little change in the fire except that it becomes brittle and ſhattery.

Examin'd by the Microſcope, it appears compos'd of a but ſlightly debas'd cryſtalline matter, part of it of an agreeable pale red, part of a very pure, bright and conſiderably tranſparent white; theſe different colours are never ſeen in the Moleculæ of the Stone, but are found in the different ſmall maſſes which are very rudely and irregularly intermixed one with another, but cohere very firmly wherever they come into contact; ſome of theſe ſeem almoſt pure homogene Cryſtal, others are plainly debas'd with this white Earth alone, and others contain both that and Talc in their different degrees, and are accordingly differently obſcure, and of a tabulated ſtructure.

Examining the effect of fire on this Stone more nicely, I found, that its making it more friable and ſhattery, was in very different manners, according to its different degrees; a ſlight heat will make the Moleculæ it is compos'd of, readily part from one another, tho' it does not at all affect their peculiar ſtructure, a more ſtrong degree ſeparates them into the ſeveral Moleculæ they were originally compos'd of, the commiſſures of which were not at all viſible even to the aſſiſted eye before, and a yet more violent fire calcines the whole into a looſe powder, and perfect opakeneſs. It is obſervable from the fires diſuniting the ſeemingly ſimple Moleculæ of this maſs, that the ſtructure I have obſerv'd in the Phengites, and all the tabulated Spars, is not peculiar to that ſet of Foſſils, but that very many more, which we may look upon as ſimple concretions, are, in reality, alſo compound maſſes, and might be reſolv'd or diſunited, if we knew the art, into either regular or uncertain figures.

This is brought chiefly from the Scotch ſhores, and us'd with the former in the pavements of our ſtreets.

3. *Telaugium rubeſcens, albo & nigro variegatum.*
Red Telaugium, variegated with white and black.

This is a ſubſtance of the ſame nature with the two former, but greatly more beautiful than either, and often excelling even the moſt elegant of the Granites.

It is of a rude, irregular and coarſe ſtructure, but very compact, firm and hard, of a ſmooth, bright and gloſſy ſurface, in ſize little inferior to the precedent, being often found to ſixteen or eighteen inches in diameter, and generally of an oblong flattiſh ſhape. Its colours are all very elegant, and very bright and ſtriking; what may be moſt properly call'd the baſis, is a very elegant and agreeable red, which is mottled and variegated in different degrees, and various forms, with a white pellucid, and black cryſtalline Talc; the manner of the diſpoſition of theſe variegations, and their different admixture, is ſo very various, that I well remember, when firſt I engag'd in theſe ſtudies, I thought I had collected more than twenty diſtinct ſpecies of this kind; a ſtrict review of them, however, has convinced me, that they are only varieties of the diſpoſition of the ſame matter, and they ſhew that the black and white talcy cryſtalline ſubſtance is ſometimes in this Stone confuſedly blended with the common maſs, as in the former inſtances; in this diſpoſition it makes a very pleaſing variegation, and the whole becomes extreamly beautiful, and is in this ſtate very like the moſt beautiful oriental Granite. In other ſpecimens this white and black matter are confuſedly and irregularly blended together, and diſpos'd in common veins thro' the whole, and in others are kept in like manner diſtinct from the red matter of the maſs, and alſo diſtinct in themſelves, and form regular and even horizontal veins, ſome white, and others black; and in all theſe caſes the very matter of theſe variegations, tho' compos'd of no other ſubſtances than Cryſtal, Earth and Talc, and never without a greater or leſſer admixture of all the three, is yet combin'd in ſuch different proportions and forms, as to afford an almoſt infinite variety of more or leſs opake, and more or leſs tabulated Moleculæ; among theſe there are alſo in this ſpecies frequent inſtances of flakes of pure Talc, both black and white. It is commonly very bright and gloſſy externally, but ever extreamly ſo within. It is of conſiderable weight and hardneſs, and capable of an elegant poliſh.

It very freely and readily gives fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It ſuffers very little change of colour in the fire.

Examin'd by the Microſcope, it affords in its different parts great variety, and many very pleaſing objects; it is common to find among its red and white matter, particles with nearly the luſtre and tranſparence of the gems; its flaky cryſtalline matter is ever more opake; but its pure Talc is, I think, often the very fineſt to be met with in the world; many flakes of the white are perfectly bright and pellucid, and many others opake and ſilver-like, as the finer Talcs become by calcination; and the black Talc is plainly the fineſt, moſt pure, and gloſſy that nature any where affords us; it is amazing to ſee the intimate contact and cloſe union of theſe different bodies into this firm and compact maſs; in the general breaking of the Stone they are found much oftener to break and tear to pieces than to ſeparate; and in thoſe ſpecimens, plainly compos'd of different ſediments, viſible in their horizontal veins, it is very rarely that the Stone breaks more readily, even at the commiſſures of theſe than in any other place.

It is found on the Guernſey ſhores, and brought to London for the common pavements of the ſtreets; it would make a pompous account in a foreigner's journal, if any one had ever hit upon the obſervation, that in the city of London the very ſtreets are pav'd with Stones equal to the Granites of Arabia in beauty, hardneſs, and luſtre, and perhaps would ſcarcely be believ'd; but whoever will walk the ſtreets in a haſty ſhower of rain, will ſee even their ſurfaces, when thus waſh'd from dirt, ſpeak the truth of the obſervation.

4. *Telaugium duriſſimum, & ponderoſiſſimum, cinereo nigreſcens, albo variegatum.*

Hard, heavy Telaugium, of a greyiſh-black, variegated with white.

This is plainly the hardeſt and heavieſt of all this claſs.

It is of a rude, irregular, and more harſh texture than any of the former, and more compact, firm, and hard than any of them; it is of a ſmooth and even, but not polite or gloſſy ſurface, of conſiderable ſize, generally about ten or twelve inches in diameter, and of a perfectly uncertain ſhape, but generally retaining a flatneſs in that part which was its bottom at its firſt ſubſidence; it has fewer colours, and leſs beauty than any of the former, being compos'd only of a greyiſh or blueiſh black, and an opake but very fair and bright white; theſe are each in its ſeparate Moleculæ, and are never lodg'd together in diſtinct maſſes, but ever equally and regularly intermix'd in the whole Stone, ſo that there is no where a great black or white ſpot or vein, but every where a regular and equal mix'd black and white maſs; the Moleculæ of which this body is compos'd are alſo ever very regular in ſize, and very ſmall in compariſon of thoſe of the ſpecies before deſcrib'd, being ſeldom more than of a one tenth or one twelfth of an inch diameter each; they are both of a ſomewhat talcy tabulated ſtructure, pretty equally ſo among one another, but much leſs ſo than in the generality of theſe bodies, and are when freſh broken of very remarkably ſmooth gloſſy ſurfaces, and great brightneſs; it is very remarkably hard and heavy, and capable of a high poliſh, but not eaſily work'd to it.

It readily gives fire with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It ſuffers very little change of colour in the fire.

Examin'd by the Microſcope, its white parts appear of a moderate degree of tranſparency, and of a fine clean white, with but little general appearance of Talc, and ſcarce any viſibly tabulated texture; its black parts appear of a true, very fine, and very gloſſy black, and evidently contain more Talc, and are of a more tabulated texture than the white, tho' not ſo much ſo as moſt of the other ſpecies; there is one thing, however, very peculiar in the ſtructure of this ſpecies thus examin'd, which is, that as all the others are compos'd of ſeparately concreted Moleculæ, cohering firmly wherever they are in contact, but never entering into one another's texture; in this each Molecule has evidently been broke among, and by that means much more firmly united with its neighbouring ones than it could poſſibly otherwiſe have been; this may in a great meaſure be the occaſion of the uncommon hardneſs of the Stone, and this texture is eaſily accounted for on the principles of the others, only allowing its final coaleſcence to have come on while its Moleculæ were in a ſomething ſofter ſtate; it has been already obſerv'd, that they have all been form'd of ſeparately concreted ſmall maſſes of matter falling together, and concreting afterwards into one maſs, the final coaleſcence of which, by the ſhrinking of the maſs, neceſſarily the conſequence of the abſence of the water, has drawn the now harden'd Moleculæ irregularly together, and cruſh'd and compacted them in the irregular directions we find them in; and it is eaſy to conceive that the ſame agent, acting with the ſame force on Moleculæ leſs harden'd, would cruſh them into the very ſubſtance of one another, and could not do otherwiſe than form exactly ſuch a complex and irregular maſs as we find this Stone to be.

I have obſerv'd it in many places on the Yorkſhire ſhores, and met with it more than once in our pavements, tho' it is not common there.

5. *Telaugium rubido-fuſcum, albido, & ſubflavo variegatum.* *Browniſh-red Telaugium, variegated with white and yellowiſh.*

This is a very ſingular body of this claſs, and not without its beauty, tho' very different from all the reſt, and deſtitute in a great meaſure of their variegations and brightneſs.

It is of a ſomewhat equal and fine texture, moderately compact and firm, of a ſmooth and even, but not at all gloſſy ſurface, of a moſt remarkable ſize, being often ſeen from three to four feet in diameter, and in ſhape generally of an oblong and ſomewhat flatted figure; its baſis or ground colour is a pale but not diſagreeable reddiſh brown, of no great luſtre, and without all tranſparence, and its variegations conſiſt of large Moleculæ of a talcy impure cryſtalline matter, generally of about an inch long, and half an inch in diameter; theſe are of an obſcurely tabulated ſtructure, are of ſome brightneſs, and are either of a pure or yellowiſh white; there are generally many, both larger and ſmaller, than theſe I have mention'd in the maſs, but this ſeems to be the moſt general ſize, and is ſo different from that of all the reſt, as to be a very ſingular appearance; theſe Moleculæ are not cluſter'd together, as in the other maſſes of this kind, but often ſtand at four or five inches diſtance from one another, and leave theſe large ſpaces perfectly free and vacant; the Stone is but moderately heavy, but is tolerably hard, and may be made to take a good poliſh.

It very readily gives fire with ſteel.

It will not make the leaſt effervеſcence with Aqua Fortis.

It burns to a darker and redder colour.

Examin'd by the Microſcope, its common matter appears plainly enough of the texture of all the other bodies of this claſs, made up of ſmall maſſes or Moleculæ, and theſe compos'd of a cryſtalline matter, debas'd by a great admixture of earth, and not without more or leſs of a foliaceous Talc in moſt of them; theſe are crouded very cloſe together, and ſeem to cohere pretty firmly wherever they touch, but are no where driven into, or mixt among one another's ſubſtance; in this matter, as a bed, lie the larger white and yellowiſh Moleculæ before deſcrib'd; they are diſpos'd in all directions, but if we conſider the original ſite of the Stone, which is eaſily determin'd by its flat ſide, we ſhall ſee they have all ſome ſign of having been originally in an horizontal direction, tho' ſqueez'd out of it by the final coaleſcence of the whole maſs; theſe examin'd by the Microſcope appear plainly of a tabulated ſtructure, and compos'd of cryſtal and earth, with ſome Talc; the yellow ſeem not to owe that tinge to an earthy, but a mineral matter, ſince they are more bright and pellucid than the others; it is pretty evident from the whole, that the formation of this was not in all reſpects the ſame with that of the other bodies of this claſs, the whole conſtituent matter of them ſeems to have coaleſced and ſubſided together; but in this the general matter has evidently been firſt form'd, and the variegations have been ſo many ſeparate concretions of a different matter, which have ſubſided upon, and been receiv'd into its maſs while yet moiſt.

It is found on the ſurface of the earth in many parts of Yorkſhire, and in ſome other counties.

6. *Telaugium rubro albeſcens, nigro & aureo variegatum.* *Reddiſh-white Telaugium, variegated with black and gold colour.*

This is a very elegant and beautiful maſs, and not inferior in hardneſs to many of the former, tho' of a more looſe and ſhattery look than almoſt any of them all.

It is of a very coarſe, large, and rough texture, but withal is very firm and compact, of a ſomewhat rough and uneven ſurface, and of very uncertain ſize, but generally between four and eight inches in diameter, of a very irregular ſhape, ſeldom round, oval, or flat, and in colour either of a pale fleſh colour, a ſomewhat deeper red, or an abſolute white, for I have ſeen ſpecimens of it with the red tinge in all degrees, and in ſome abſolutely wanting; its Moleculæ, which are of this colour, and which compoſe the body of the maſs, ſeem a mere cryſtalline matter debas'd with earth, and more or leſs imbu'd with a metalline tinge; theſe are of uncertain figure, but generally much of a ſize, and of about the bigneſs of a horſe-bean; among theſe are interſpers'd its black and yellow variegations, which are of a plainly tabulated texture, and generally thin and flat in their general figure; theſe are compos'd of Cryſtal, Earth, and Talc, and are of different degrees of luſtre, but the yellow generally brighter than the black, the yellow are much of the conſtitution of the variegating yellow maſſes of the former ſpecies, and of equal brightneſs and tranſparency, but in general of a more talcy appearance; the black are mixtures of black Talc and Cryſtal in very various degrees, and of variouſly plated, and generally very irregular figures, ſometimes oblong, ſometimes roundiſh, and among theſe there are ſome flakes of plain and perfectly pure Talc; it is of a very conſiderable hardneſs, very heavy, and capable of a fine poliſh.

Examin'd by the Microſcope, the white or reddiſh parts are ſeen to be very bright and moderately tranſparent, the red ones more ſo than the white, and therefore plainly owing their colour to a metalline tinge, and the yellow and black more looſely laid among, and ſeeming to cohere leſs firmly with thoſe maſſes, or with one another; it ſeems indeed here as if the cryſtalline Moleculæ had been firſt form'd and ſubſided, and that theſe others, which are more talky, and make the variegations, were form'd afterwards, and falling upon, and among them, even while they were not yet united into a body, but tumbling about in the fluid were receiv'd among them, and afterwards thruſt into theſe directions at the general coaleſcence of the maſs; their having leſs coherence than the Moleculæ of theſe other maſſes commonly have, ſeems to ſhew, that either they were all, or the one ſet of them, at leaſt, conſiderably harden'd before their union.

It is common on the ſhores of Yorkſhire.

7. *Telaugium duriſſimum, albidum, fuſco variegatum.*
Hard, white Telaugium, variegated with brown.

This is a Stone of leſs beauty than many of the foregoing, but equal to moſt of them in hardneſs. It is of a very coarſe and harſh texture, but extreamly firm and compact: of a very ſmooth and even, but not gloſſy ſurface, of various ſize, from two to ten inches in diameter, and generally of a roundiſh or oval ſhape. Its general colour is a duſky white, and its variegations of a pale, but not diſagreeable brown, both theſe colours are in large diſtinct Molecules, cohering very firmly with, but no where running into the ſubſtance of one another; and among theſe are very beautifully interſperſed a multitude of flakes, ſome of a pure, others of a cryſtalline Talc, but all white, and in ſome degree pellucid. It has but little brightneſs on the ſurface, but when freſh broken, glitters very much, eſpecially in its white parts, and the gloſs of the talcy flakes make a very pretty variegation with it. It is conſiderably heavy, of very remarkable hardneſs, and I believe, capable of a good poliſh, but not of beauty to tempt any body to try it.

It very freely gives fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a greyiſh white.

Examin'd by the Microſcope, it appears a maſs of cryſtalline, earthy and talcy matter, combin'd in various proportions in the different parts; the white maſſes are by much the pureſt, and moſt approach to tranſparency; theſe are generally compos'd of Cryſtal and Earth alone, ſome few of them only having a talcy mixture, and being by that determin'd into a flaky or foliaceous texture; the brown, which make the variegations, and are generally in ſmaller maſſes, ſeem the very ſame matter with the white, only farther debas'd by an admixture of more earth of that colour; theſe are much more opake, and ſeem ſofter than the white; and among all theſe are ſcatter'd, in various directions, a multitude of flakes of Talc, from the breadth of a pea to that of more than an inch; ſome of theſe are pure, bright, pellucid, and flexile, others have mixtures of this earthy Cryſtal, which debaſes them from all thoſe qualities.

It is common in Weſtmoreland and Yorkſhire, both on the ſhores and in the gravel-pits.

8. *Telaugium friabile, albido ſubcæruleum.*
Blueiſh-white, brittle Telaugium.

This is the ſofteſt and moſt friable of all the bodies of this claſs, and that for this plain reaſon, that it contains more Talc, and leſs Cryſtal, than any other kind.

It is of a very rude, irregular, and flaky texture, of a rough and uneven ſurface, and of very conſiderable ſize, being frequently found of ten, twelve, and fourteen inches diameter, and of a perfectly uncertain figure, ſeldom much approaching either to round or oval, and generally rough and jagged at the ends and edges; its colours are only two, a dark blueiſh grey, and a pretty pure but opake white; the former of theſe may properly be call'd the ground, the white the variegation; tho' in this it is very ſingular, that as in all the ſpecies hitherto deſcrib'd, the cryſtalline matter has been found the baſis or ground, and the Talcy only making a part of the variegations, in this the Talc is properly the body of the maſs, and the ſtony matter makes only a ſlight variegation in it; the whole is, however, diſpos'd in ſeparate maſſes or Moleculæ, as in the other ſpecies, the ſtony or cryſtalline ones are generally much of a ſize, and ſeldom exceed the bigneſs of a horſe bean; they are commonly of an oblong form, and thick, the talcy matter is in much larger maſſes, all broad and flat, ſome of them of more than an inch in diameter, and moſt of them of pure Talc, without any admixture of cryſtalline matter, tho' the cryſtalline are, many of them, plainly impregnated with Talc, and of a plated texture; it generally has no ſmall degree of brightneſs on the outſide, but when broken is ever extreamly gloſſy; it is but moderately heavy, and in compariſon of the other bodies of this Genus, very friable, which is not to be wonder'd at, ſince being compos'd principally of Talc, the flakes of that ſubſtance can never cohere ſo cloſely as the maſſes of ſtony matter in the others, either with one another, or in their own particular ſtructure; and I have obſerv'd, by frequently breaking this Stone, that it is, with about equal eaſe, that the ſeparate maſſes of Talc either ſplit or ſeparate from one another, and the cryſtalline matter, ever coheres much more firmly with theſe than they do with each other. It would be ſcarce poſſible, I believe, to give the whole any kind of poliſh.

Its cryſtalline parts very readily give fire with ſteel.

It makes no effervеſcence with Aqua Fortis.

It burns to a conſiderable whiteneſs in the cryſtalline parts, and a ſilvery gloſs and opacity in the talcy.

Examin'd by the Microſcope, its cryſtalline maſſes ſeem the ſame with thoſe of the other Micæ, its foliaceous parts pure unalter'd Talc.

It is common in Yorkſhire, and the neighbouring counties, where the people heat it thoroughly by the fire on the winter nights, and lay it at their feet in bed; it retains heat a long time, which makes it more fit than any other ſpecies for this uſe, and it has thence acquir'd in Yorkſhire the common name of the *warming ſtone*: Dr. Woodward has mention'd this ſpecies, v. 1. p. 62. ed. 7. and calls it a Talc with ſome white Spar intermix'd; this is an error that Gentleman has alſo run into in regard to almoſt all the bodies of this claſs, for want of experiment and cloſe obſervation, for there is indeed no grain of Spar in this or almoſt any other of them; the error has ariſen from the not knowing any thing of that commoneſt of all mixtures in the Foſſil world, Cryſtal and a white Earth, which its true origin having never been hitherto enquir'd into, generally paſſes for Spar, from its general external reſemblance to that ſubſtance.

9. *Telaugium fuſcum, friabile, flavo variegatum.*
Brown, friable Telaugium, variegated with yellow.

This is a very ſingular and very beautiful Stone; it is of a moderately fine and even texture, but more looſe and crumbly than any of the former, of a ſomewhat rude and rough ſurface, full of ſmall prominencies, and not unfrequently ſunk in many places into large cavities, the hollows of which are never any more plain or ſmooth than the reſt of the ſurface of the Stone, but rough with the ſame ſort of prominencies, which are in reality no other than the natural Granules or Moleculæ that compoſe the Stone, plac'd in a rude diſorderly manner; its ſize is various, but ſeldom very large, from three to ſix inches diameter ſeems to be its uſual ſtandard; its ſhape is often perfectly irregular, often flat and tending to oval; the ſeparate Moleculæ that compoſe it are ever ſmall, few of them are found exceeding one twelfth of an inch in length, and they are all of the ſame uniform colour in the ſame maſſes, tho' of different ſhades in different ones; they are always however of a pale brown, and conſiderably coarſe and opake; among theſe are interſpers'd in great abundance flakes or rather ſpangles of a fine and very beautiful pale yellow Talc; theſe are ever much ſmaller than the Moleculæ of ſtony matter, and always of a very ſingular brightneſs and beauty; among theſe are ſometimes found ſpangles of black and whitiſh Talc alſo, but theſe are not common, and brown and yellow may be properly enough call'd the genuine colours of the Stone; it has little or no gloſs on the outſide, but when freſh broken appears extreamly beautiful; it is but moderately heavy, more ſoft and crumbly than any other of this Genus, and ſcarce capable of any tolerable poliſh, the ſpangles often falling off in breaking, or even rubbing it.

It but difficultly ſtrikes fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a pale browniſh-grey, with no alteration in the colour of the Talc.

It becomes more brittle and ſhattery than any other ſpecies in paſſing the fire.

The reaſon of any of theſe becoming friable and ſhattery by fire, is, that Cryſtal is the band of union in them all, and *that* in calcination being reduc'd to a ſort of looſe powder, can no longer perform ſuch an office, and hence this and ſuch other Stones as contain leſs Cryſtal, and more extraneous matter, are eaſier and more affected by fire, and ſooner become ſhattery in it, than ſuch as have more, and approach more to the nature of pure Cryſtal.

Examin'd by the Microſcope, this ſhews its ſtructure and origin very plainly, its ſtony Moleculæ are of a very rude, rough, and irregular texture, very ſoft and crumbly, and perfectly opake, and evidently compos'd of a cryſtalline matter, ſo deeply ſated with earth as to retain very little of the character of Cryſtal; its flakes appear of a pure texture, and perfect gold colour, and cannot be diſtinguiſh'd from ſpangles of the fine Amyſinian Orpiment of the Antients hereafter to be deſcrib'd, but that on the teſt by the fire they retain their colour, whereas were they orpiment, they muſt become red.

It is found in many places on the Suſſex and Yorkſhire ſhores, as alſo in digging in thoſe and other counties: I once found a ſpecimen of it thrown up among gravel on Hampſtead-heath, which had not only the yellow, but the black and white ſpangles among them.

10. *Telaugium duriſſimum, purpureo-fuſcum, flavo & albo variegatum.*

Hard, purpliſh, brown Telaugium, variegated with white yellow.

This is another very ſingular and elegant Stone. It is of a very rough, coarſe, and unequal texture, but very compact, firm, and hard, of a rough unequal ſurface, and generally of conſiderable ſize; from ten to eighteen inches ſeeming to be its common ſtandard. In ſhape it is ever approaching to round or oval, and always very manifeſtly ſhews which part has been originally its bottom, by a remarkable flatneſs and ſmoothneſs on that ſide. Its colours are generally only two, brown and white, or brown and yellow, tho' I have ſeen ſome ſpecimens of it, where the white and yellow variegations have appear'd in the ſame maſs. It is compos'd of a multitude of irregularly plac'd, but very firmly united Moleculæ, like the reſt of theſe maſſes; the purple or browniſh ones which make the ground, are generally conſiderably large, of a plain even ſtructure, and perfectly opake. Its white and yellow ones are commonly ſmaller, more bright, and in ſome degree pellucid; and compos'd of an admixture of Cryſtal and Talc, forming together obſcurely and irregularly tabulated Molecules, which are ſometimes left pure and white, but more frequently ting'd with a fine pale yellow, and that evidently,

dently, not by an admixture of ochreous earth, but by a light metalline tinge, for they are always brighter and more pellucid than the white; and in that fall in with the general obſervation in matters of this kind; the metalline tinges generally being found only in the more pure maſſes of the ſtones. It is but obſcure and dull on the ſurface, but has ſome brightneſs when freſh broken. It is moderately heavy, tho' not nearly ſo much ſo as might naturally be expected from its ferrugineous appearance of very great hardneſs; and I believe capable of a very good poliſh.

It very freely and readily gives fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It burns to a fine florid red without any change in the white or yellow parts, but that they become perfectly opake.

Examin'd by the Microſcope, the brown parts if ſeparated into ſmall pieces are ſomewhat tranſparent, and plainly appear a cryſtalline matter debas'd by an admixture of a ferrugineous earth. The white and yellow maſſes are of various degrees between Talc and Cryſtal, ſome of them are ſcarce viſibly of a tabulated ſtructure, and ſome almoſt plain Talc; but the greater number are of a middle nature between theſe, eaſily breaking according to the range of the flakes, and exhibiting an irregularly plated, and crack'd and ſhattery texture.

It is found frequently on the ſhores about Scarborough, and I have once or twice met with it among the pavements of our ſtreets. Dr. Woodward ſeems to have deſcrib'd a Stone like this, V. 1. p. 63. Sp. 21. from Cornwall, which he ſays held ſome ſulphur and a little tin. I have never been able to find, however, that this contain'd any metal but iron, except the ſlight tinge of its yellow variegations, which is probably from lead.

II. *Telaugium ponderoſiſſimum, rubrum, nigro & albo variegatum.*
Heavy, red Telaugium, variegated with black and white.

This is a ſubſtance known to the miners in many parts of the kingdom under the name of Call; tho' I have found them ſometimes calling the preceding ſpecies, and ſometimes many other different ſubſtances by that name. Dr. Woodward mentions this, V. 2. p. 65. Sp. 44.

It is of a moderately fine and equal texture, extreamly hard, compact and firm, and generally of a ſmooth and even, tho' not at all gloſſy ſurface. It is of various ſizes, from five to twenty inches in diameter, and ſeems to have no general ſtandard between theſe, being frequently found of all the ſizes between them in the ſame vein. In ſhape it generally approaches to round or oval, and has ever a flat ſide, which has been its original baſis, tho' in the earth it is frequently found with that part ſide-ways or uppermoſt, from the toſſing about it had met with from the agitation of the fluid it was form'd in before it was ſuffer'd to reſt. It is compos'd of very ſmall Moleculæ, of uncertain figures, a plain, even ſtructure, and ſeeming to contain no pure Talc. Theſe are of a fine ſtrong red, variegated very elegantly with black and white maſſes, irregularly interſpers'd among them, and lodg'd in all directions; the white are very bright and gloſſy, and commonly of a plainly tabulated ſtructure, the black more bright and glittering, but of a leſs regular ſtructure than they, and the whole making together a very pleaſing variegation. It has but little brightneſs on the outſide, and indeed leſs than moſt others within, but when freſh broken, its black and white variegations are very lucid. It is of very remarkable weight, extreamly hard, and I believe capable of a tolerable poliſh.

It very readily and freely ſtrikes fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It burns to a duſky browniſh purple, without much change in its white or black parts.

Examin'd by the Microſcope, its red Moleculæ are ſeen plainly to contain Talc, and emulate a tabulated ſtructure, tho' that was not at all diſtinguiſhable by the naked eye; they are very opake, and of a rough irregular texture, and ſeem, beſide the ſmall portion of Talc they hold, to be compos'd of a great quantity of a ferrugineous Earth, embodied in Cryſtal: Its white maſſes contain different quantities of Talc, and are differently plated, but are of the pureſt and leaſt earthy Cryſtal of I think any of this Genus; the black, as they are generally call'd, and as they indeed appear to the naked eye, are here diſcover'd to be the ſame with thoſe of the firſt deſcrib'd ſpecies, a true green Cryſtal, debas'd by a large admixture of Talc, and no ſmall quantity of earth. Dr. Woodward imagin'd the white parts of this as of the other Micæ in general to be Spar, as has been before obſerv'd, but perfectly erroneouſly, they not making the leaſt effervefcence with Acids, ſtriking fire readily with ſteel, and anſwering to all the other characters of Cryſtal, tho' to no one of Spar.

It holds a ſmall quantity of iron, and is often found about the mines of that metal in Suſſex, Glouceſterſhire, &c.

12. *Telaugium duriſſimum, cæruleo-virens, albo variegatum.*
Hard, blueiſh-green Telaugium, variegated with white.

This is, I think, one of the moſt beautiful of this whole Claſs. It is of a moderately fine, but unequal texture, conſiderably firm and hard, yet in many places looſe, irregular and porous, of a very ſmooth, even and polite ſurface, ſeldom of any great ſize, from three to five inches being its uſual ſtandard, and in ſhape generally either round or oval, and always with one flat ſide, which has been its original bottom. Its colours are only two, a blueiſh green, and a very pure and clear white; the Moleculæ that compoſe its general ſtructure are the greeniſh ones, and theſe have never the leaſt appearance of Talc, but are a cryſtalline matter, debas'd with earth, and ting'd by ſome metalline particles, and are of a rude, irregular, and ſometimes porous texture; its variegations are ſmall maſſes of white, compos'd of Cryſtal and Talc in various proportions, and debas'd with very little earth, ſome more, ſome leſs tabulated, but all very bright and pellucid. It looks ſomewhat gloſſy on the outſide, but when broken is very bright and beautiful; it is extreamly heavy, of great hardneſs, and capable of an elegant, tho' from its porous texture, not perfect poliſh.

It very readily and freely gives fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It ſuffers but very little change in the fire.

Examin'd by the Microſcope, its blueiſh green maſſes appear ſomewhat opake, but very beautifully colour'd, and every where ſomewhat of a porous texture, tho' that was not every where diſcoverable to the naked eye; the variegations are many of them almoſt pure Cryſtal, perfectly colourleſs, bright and pellucid, others of an almoſt pure, and very flexile and elaſtick Talc, and the greater part compos'd of a mixture of theſe, and more or leſs debas'd by earth, and of an irregularly tabulated, and every where crack'd and ſtreaky texture.

This is alſo mention'd by Dr. Woodward, V. 1. p. 64. Sp. 35. and is frequently found on the ſea coaſts of Suſſex, but in the greateſt plenty on thoſe of different parts of Wales. It contains ſo much copper, that a proper Menſtruum will readily extract a green tincture from it, and a plain verdigreaſe may be ſeparated afterwards from that ſolution.

SERIES III.

CLASS I. ORDER I. GENUS II.

LITHOZUGIA.

SECT. I. LITHOZUGIA of a cryſtalline baſis and purer texture, approaching to the nature of Flint.

Commonly call'd the Pudding Stone by the Engliſh Lapidaries.

1. *Lithozugium albido-flavicans, calculis refertum.*
Yellowiſh-white Lithozugium, fill'd with Pebbles.

This is a very elegant and beautiful Stone, which at times puts on very various forms, according to the various kinds of Pebbles it contains. It is hence generally eſteem'd of various ſpecies, but the judicious and ſcientific Naturaliſt will determine it in all theſe various figures, to be but in reality, and according to the laws of nature one and the ſame: for notwithſtanding that Dr. Woodward in his Catalogue of Foſſils, Vol. 1. p. 29 and 30. Sp. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11. has rank'd theſe bodies among Pebbles, becauſe of the pebbles they contain; it is very plain, that thoſe Pebbles are no part of the Stone, but mere extraneous bodies, being only part of the gravel it concreted among; and that the Stone which is a diſtinct ſpecies of Foſſil different from all others, wou'd have been itſelf, whether it had contain'd theſe, or any other Pebbles, and that this alone is the proper ſubject of our enquiries, the inveſtigating the nature of the maſs, ſince the Pebbles which are perfectly various and uncertain, as to what ſpecies are immers'd in it, come properly to be conſider'd as Pebbles in their proper Claſs.

The cementitious matter which is the ſubſtance here deſcrib'd, is an opake Stone, of a very fine, cloſe and firm texture, of a tolerably ſmooth ſurface in its inner texture, tho' in the maſſes it is frequently very rugged and unequal in prominences and cavities. Its ſize is very various, from that of a walnut to three or four foot or more in diameter, and generally it has a rude tendency to roundneſs. It is of a pale yellowiſh colour, breaks with a ſmooth, even and flinty ſurface, and is conſiderably heavy, and of great hardneſs, and capable of a very elegant poliſh: It affords no paſſage to water thro' its pores.

It very readily ſtrikes fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It burns to a pale red.

Examin'd by the Microſcope, it appears very plainly to be a fine cryſtalline ſubſtance, debas'd by a conſiderable quantity of a yellow argillaceous earth. Its texture is perfectly ſmooth and equal, its ſurface moderately gloſſy, and toward the edges, or in very thin pieces, it is very prettily pellucid, and ſhews extreamly plain the clouds of earth that render it ſo opake as it is in the maſs; and this Earth, if the whole be nicely examin'd, will be found not equally diffus'd thro' it: It is common to find one ſpot yellower and more opake than another, and I have ſometimes ſeen parts of it almoſt pure Cryſtal.

The Pebbles contain'd in it, are of various kinds and ſizes, from the bigneſs of a pin's head to that of a large walnut.

It is found in many parts of England, particularly in Hertfordſhire, and us'd with great ſucceſs for cutting into tops of ſnuff-boxes, and other ſuch toys, the cement or true Stone taking as fine a poliſh as the Pebbles, which is not at all to be wonder'd at, ſince by this enquiry into its nature and ſtructure, it appears a ſubſtance very much of the ſame kind with them.

2. *Lithozugium albido-griſeum, calculis refertum.*
Greyiſh-white Lithozugium, fill'd with pebbles.

This is a yet finer, purer and harder Stone than the precedent: It is opake in the maſs, of an extreamly fine, cloſe, firm and compact texture, of a very ſmooth, polite and gloſſy ſurface, and that not only partially, but in the whole maſs; whatever I have ſeen of it having been ſmooth on the ſurface, and not full of prominencies or cavities like the former, but in the whole reſembling a ſmooth ſpotted Pebble. Its ſize is various, but ſeldom exceeding eight or ten inches in diameter, and its ſhape conſtantly, or with very few exceptions, roundiſh or oval. Its colour is a pale, but not diſagreeable greyiſh white, often ſomewhat blueiſh and more frequently pure white. It is of a very ſmooth ſurface when broken, and in thin pieces looks a little pellucid. It is conſiderably heavy, very hard, and capable of a bright and beautiful poliſh. Water finds no paſſage thro' its pores.

It very freely and readily gives fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It burns to a pure white.

Examin'd by the Microſcope, it appears a cryſtalline matter, debas'd with a white bole or clay in leſs quantity than the earth in the former ſpecies. It is of a fine, ſmooth, even texture, and more or leſs cloudy in different parts, in ſome almoſt perfectly pellucid. The Pebbles it contains are very uncertain as to ſize or ſpecies.

I have before had occaſion to obſerve, that the impurity of cryſtalline matter, if not prevented by other accidents, naturally tends to make it unite in larger maſſes, the coarſeſt of all cryſtalline matter, and that which is moſt of all debas'd by adventitious earth, forms the immenſe ſtrata of many quarries of Stone, the moſt pure and perfect the diamond and oriental gems; between theſe extreams there may be a thouſand middle ſtages of ſize, purity and perfection; but it is a very good general rule, that in equal circumſtances, the fouler the cryſtalline matter, the larger the maſs it concretes into.

Let it be obſerved, that theſe Lithozugia are almoſt always found in gravel pits, that is, among Flints and Pebbles; the purer part of the debas'd maſs concreted therefore into theſe Flints and Pebbles; the coarſer and fouler, where it happen'd that there was any ſuch, concreted afterwards and form'd itſelf into larger maſſes; and this is the farther confirm'd, in that among the four ſpecies of this flinty cement, which we are acquainted with, for the two now deſcrib'd, and the two following ſpecies, have only the texture of a foul flint; the finer, that is, the purer, are always found concreted into the ſmaller maſſes. When theſe maſſes were, however, concreted in and among vaſt heaps of already form'd and harden'd ſmall Flints and Pebbles, it cou'd not be but that many of theſe muſt be environ'd by, and enclos'd in the maſs; and as they were taken into it while perfectly ſoft and fluid, they cou'd not but be alſo firmly united and exactly fitted into their reſpective cavities, and hence form theſe beautifully variegated Stones.

This is found in gravel pits with the former, and us'd like it for ſnuff boxes and other toys; there was a time when in China, poliſh'd plates of this were worth their weight in ſilver, but our traders have over-ſtock'd thoſe people with them ſince, and they are now but little more valuable there than here.

3. *Lithozugium rubeſcens, calculis refertum.*
Red Lithozugium, fill'd with pebbles.

This is of the ſame nature with the two former, but of a ſomewhat leſs pure ſtructure: It is very opake, of a conſiderably firm and compact, but ſomewhat coarſe texture, of a rugged ſurface in the whole maſs, but in particular pieces ſmooth and even, tho' not at all gloſſy or polite, of very conſiderable ſize, from ſix inches to four foot in diameter, and of a perfectly rude, irregular and unequal ſhape. Its colour is a ſtrong and not diſagreeable red, but of different ſhades in different ſpecimens, and often in the different parts of the ſame piece. It ſhews a leſs ſmooth ſurface than the reſt when broken, and is ſcarce at all bright or gloſſy: In theſe circumſtances, however, it differs not a little in various ſpecimens; its fineneſs being generally in proportion to its colour, greateſt where that is leaſt, coarſeſt where there is moſt of it: It is conſiderably heavy and hard, and with care in the working will take a very elegant poliſh: It does not at all admit water into its ſtructure.

It very readily and freely gives fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It burns to a browner red, or ſomewhat like chocolate colour.

Eeamin'd by the Microſcope, it appears a quantity of cryſtalline matter, debas'd by a very large admixture, or a red Ochreo-ferrugineous earth: It is of leſs pure and equal ſtructure than either of the former, and ſcarce at all pellucid even in the thinneſt pieces.

The Pebbles it contains are various in ſize and kinds, but the Microſcope ſhews plainly that they are not ſo perfectly join'd to the maſs as in the other ſpecies, ſmall irregularities and cavities often diſcovering themſelves between; they are, however, not eaſily ſeparated, and with a little care in the workman, as fit for uſe as either of the former.

I have ſeen this in many parts of Lincolnſhire, Derbyſhire and Yorkſhire; we ſeldom have it brought up to London, tho' the ſingularity of its colour makes it a very beautiful maſs.

4. *Lithozugium ſub-fuſcum, calculis refertum.*
Browniſh Lithozugium, fill'd with pebbles.

This is of the ſame kind with the three precedent, but more impure and coarſe than any. It is perfectly dull and opake, of a ſomewhat rough and harſh texture, yet conſiderably compact and firm, of a very rough, rugged and unequal ſurface, both in the general maſs, and in the ſeparate parcels of it, and in ſize ſeldom other than very large, from two to five or ſix feet in diameter, being its common ſtandard. Its ſhape is perfectly irregular, and ſeldom ſhews any great tendency to roundneſs. Its colour is always a duſky brown, but in various ſpecimens is found of very various ſhades and degrees: It is of a rough ſurface when broken, and has ſcarce any gloſs or brightneſs. It is leſs heavy than either of the former, and of conſiderable hardneſs, but I believe, not capable of any great poliſh. It does not readily admit water into its pores.

It very freely gives fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It burns to a pale whitiſh grey.

Examin'd by the Microſcope, it appears a very coarſe and impure cryſtalline matter, debas'd in a much greater degree than any of the before deſcrib'd, with a paler or darker brown argillaceous earth. It is very far from the equality of texture the others have, and is in ſome parts little ſuperior to ſome of the ordinary quarry Stones.

The Pebbles it contains are ſome large, but the greater part very ſmall, the generality of them not exceeding the eighth of an inch in diameter; they are generally either round, or a little flattiſh.

It is very common in Leiceſterſhire and ſome other counties. Dr. Woodward has mention'd it, V. 1. p. 33. he had it from the neighbourhood of Glouceſter, and obſerv'd there, as I have alſo in other places, that where the maſſes of this are, there are generally alſo many of the ſmall pebbles looſe; this, however, is little to be wonder'd at, ſince were it neceſſary to ſeek their origin from the diſunited matter of theſe maſſes, any one who carefully examines their ſtructure, will find it very poſſible, that the injuries of weather in a long tract of time, may have deſtroy'd its texture, and let the Pebbles looſe.

SECT. II. LITHOZUGIA of a coarſer texture, approaching to the nature of Quarry Stone.

1. *Lithozugium albido rubeſcens, Scrupis Cryſtallinis, impurioribus, carneis refertum.*

Fleſh-colour'd Lithozugium, fill'd with reddiſh, impure, cryſtalline Nodules.

This is a very extraordinary Stone, and is not without its beauty, tho' very different from, and greatly inferior to the former kinds; it is of a coarſe, harſh, and looſe texture, and ſomewhat porous, of a rough, irregular ſurface, in ſize very various and uncertain, but generally between four and twelve inches in diameter, in ſhape almoſt always flat, but ſeldom with much tendency either to a round or oval figure, and generally ſo extreamly full of the maſſes it contains, that it is hard to find a ſpeck of the pure cement of the bigneſs of a pea; its colour is a very pale, whitiſh red, or fleſh colour; it breaks with a very rude and uneven ſurface, and has not the leaſt gloſs or brightneſs; it is conſiderably heavy, and moderately hard in the maſs, but not capable of a regular poliſh. Water finds a paſſage but ſlowly into its ſtructure.

It does not ſtrike fire with ſteel without ſome difficulty.

It makes not the leaſt effervefcence with Aqua Fortis.

Examin'd by the Microſcope, it appears a very coarſe and impure maſs, compos'd of a very highly debas'd Cryſtal, containing more than its weight of a pale red clay; it is of a very coarſe and looſe texture, cavernous and ſpungy, and perfectly opake, but not without ſome ſpecks of a purer Cryſtal here and there, diſcovering themſelves in lucid ſpots, as is the caſe in many of the Quarry Stones.

The Nodules it contains are all of one and the ſame ſpecies, and are not, like the Pebbles in the former maſſes, inveſted with a cruſt, but are maſſes of the common Scrupus Cryſtallinus elſewhere deſcrib'd, ting'd with red, as it is there mention'd frequently to be, and of all the various ſizes, from an inch diameter to the bigneſs of a pin's head; theſe are crouded together in prodigious numbers, and lie in all directions, often the ſmall ones are found alone, either compoſing a ſeparate maſs, or a diſtinct part of one of the mix'd maſſes; and where the larger are found, they are not lodg'd alone in the cement, but have ever almoſt innumerable ſmall ones between, around, and among them; theſe larger maſſes are eaſily ſtruck out of the cement, and leave a moderately ſmooth cavity in it, plainly compos'd of the ſides and ends of ſmaller maſſes of the ſame kind with their interſtices fill'd up with the cementitious matter, which is the baſis of the whole; it is not to be wonder'd at, that theſe Nodules ſeparate from the common matter of the Stone in this ſpecies more eaſily than the Pebbles in the former kinds, ſince the cement here being ſofter, coarſer and more porous, not only comes into contact in much fewer places, but is more eaſily broken itſelf, even where it does. Its origin and production ſeems owing to the ſame principles with thoſe of the former kinds, a parcel of debas'd and impure cryſtalline matter ſubſiding together in the once univerſal fluid; its leſs foul part firſt concreted into theſe Nodules of different ſizes, and ſoon afterward the more debas'd and earthy portion coaleſcing according to the fix'd and invariable laws of nature, into one large maſs or continu'd ſubſtance, became the bed every where encloſing and ſurrounding theſe firſt concreted maſſes.

It is very frequent on the ſides of the hills in Yorkſhire, and wherever it is found, as in the former inſtance, the Nodules naturally contain'd in it, are conſtantly found looſe alſo at the bottom, or the flatter parts of the hills.

2. *Lithozugium ſubcæruleum, ſplendidum, Scrupis cryſtallinis, albidis, impurioribus refertum.*

Blueiſh, glittering Lithozugium, fill'd with white, impure, cryſtalline Nodules.

This is alſo a very ſingular Stone, and extreamly different from every thing elſe of this Genus. It is ſomewhat coarſe and harſh, of a rough, uneven and irregular ſtructure, but not at all porous, and of an irregular and uneven ſurface, of various ſize, from one foot to four or five in diameter, and generally of a flattiſh ſhape; its colour is a deep duſky blue, or lead colour, not all over equally gloſſy, but very thick, ſet with bright and glittering ſpangles; it breaks with a rude ſurface, and in its general figure and texture ſeems much of kin to ſome of the lime ſtones; it is very heavy, moderately hard, and capable of a very pretty poliſh; it will not at all admit water into its pores.

It freely and readily gives fire with ſteel.

It makes a very ſlight efferveſcence with Aqua Fortis, and is about one eighteenth part diſſolved by it.

It burns to a pale grey.

Examin'd by the Microſcope, it appears compos'd of a cryſtalline matter, deeply ſaturated with an argillaceous earth, and containing in many places a number of bright, flat ſpangles; theſe are what are ſo glittering to the naked eye, and by their flatneſs and reſplendency might eaſily be taken for flakes of a foliaceous Talc; but they appear when ſtrictly examin'd to be fragments or ſmall concretions of a complex tabulated Spar, very bright and pellucid, and of a ſomewhat yellowiſh white; theſe alone are what ferment with Aqua Fortis; the body of the ſtone itſelf containing no particles of any alkaline matter; and theſe when taken up by the acid, and the remainder afterwards weighed, will be found in the places moſt full of them to have made up about one eighteenth part of the ſtone; the cryſtalline maſſes are the ſame with thoſe in the former ſpecies, only not colour'd, and having been before deſcribed in their proper place, need nothing to be ſaid of them here; it is to be obſerv'd, however, that the origin of this ſtone is ſomewhat different from that of the former; that having been evidently the ſeparate concretion of the different parts of the ſame maſs of matter, this ſo perfectly different in its maſs from the matter of the nodules it contains, that it cannot but have been that the matter of the maſs concreted alone, and theſe nodules which are one of the commoneſt Foſſils in the world, concreting afterwards in the fluid above it have ſubſided on, and were received into its yet ſoft maſs.

I have obſerved it in many parts of Leiceſterſhire, and ſome of the adjoining counties, as alſo on the Scarborough ſhores. I have not known it put to any uſe, except that I have once or twice met with it in the pavements.

3. *Lithozugium elegans, albido vireſcens, ſcrupis cryſtallinis refertum.*

Whitiſh green, elegant Lithozugium, filled with cryſtalline Nodules.

This is a very elegant maſs; it is of a conſiderably fine, cloſe and compact texture, and moderately firm and hard, of a rough, rugged and unequal ſurface, the cryſtalline nodules generally ſtanding far out from their cement, and that being but of a rude and uneven ſurface, without the leaſt gloſs or brightneſs; in ſize, it is very various and uncertain, I have ſeen of it from two inches to two foot in diameter, in ſhape it is generally flattiſh, but ſeldom has much tendency either to round or oval; its colour is a pale whitiſh grey, variouſly and very irregularly tinged with a very beautiful green; this colour is not equally as in moſt other caſes, diffus'd thro' the whole maſs, but is lodg'd in differently ſiz'd ſpecks and clouds, and makes a very pleaſing variegation by its manner of mixture with the maſs; it breaks with an uneven rough ſurface, and is perfectly opake and without brightneſs; in the breaking it, the cryſtalline nodules are generally diſlodg'd from their places, and leave cavities anſwering to their ſurfaces, and generally very ſmooth, but not gloſſy; but ſometimes they remain in their places, and are broken with the common matter of the ſtone; theſe are generally ſmall, not exceeding the ſize of ſmall peas, and uſually alſo ſomewhat roundiſh, but they are ſometimes larger and oblong, they appear of a very beautiful deep green on their outſide, but are perfectly white and opake when broken; they are only ſmall nodules of a pure, complex, tabulated Spar, differing from the Phengites marble only in colour and external figure; the colour of their ſurfaces is entirely owing to the green matter of the maſs which has before been obſerv'd not to be diffus'd equally thro' it, but to be lodg'd in clouds and ſpots, and is no where in ſuch plenty as in the interſtices between theſe nodules and the maſs of the ſtone; the whole is moderately heavy, of a conſiderable hardneſs, but not capable of any great poliſh. Water ſlowly finds its way into its ſtructure.

It does not without difficulty give fire with ſteel.

It makes a partial efferveſcence with Aqua Fortis.

It burns to a very pale grey.

If carefully examin'd in regard to the acid, it will be found that the cement itſelf or true matter of the maſs, does not ferment with it at all, but the nodules only, and theſe indeed when ſeparated do it violently, and are wholly diſſolved by it.

Examin'd by the Microſcope, it appears an opake but not unelegant maſs; it is compos'd of a cryſtalline matter, highly ſaturated with a greyiſh white clay, and that ſpotted and vein'd with a very elegant green; the ſpots of this colour are perfectly irregular both in ſhape and poſition, but are generally very numerous, but ſmall, the white part is opake, the green ſomewhat tranſparent, and not wholly without brightneſs.

It is found on the ſhores of Minorca, and in ſome few places on the Engliſh coaſt, as alſo in the more inland parts of the kingdom in digging.

The grey part of this maſs ſeems to have been the ſubſtance that firſt concreted; this probably while moiſt and ſoft, received into it firſt the ſparry nodules, and afterwards the ſeparately concreted green Cryſtal; which falling into its looſer matter, made its way into it, and remaining wherever the laxity of the texture of the grey had left its cavities, there hardened into the form of the ſpots we ſee it in; the lax and rare texture of cryſtalline matter neceſſary to account for the variegation of this ſubſtance is not common, but that it has a place in bodies of this Claſs, the yet laxer texture of the next deſcrib'd ſpecies, added to what an accurate obſerver will diſcover yet remaining in the whiter parts of this, will ſufficiently prove.

4. *Lithozugium friabile, pallide rubens, venis albis & nodulis rubris variegatum.*

Friable, pale red Lithozugium, variegated with white veins and red nodules.

This is the ſofteſt and moſt friable of all this Claſs; it is of a coarſe, lax and ſomewhat porous texture, of a rough irregular ſurface, very various in ſize, maſſes of it being frequently found of all diameters between one and twenty or thirty inches, and in ſhape always flat, but ſeldom much approaching to round; its colour is a pale red, very various in degree in different maſſes, and in the different parts of the ſame, ſome of it being often of a good brick colour, and other parts a pale fleſh colour, or nearly white; it is very rude and irregular externally, nor much better within, breaking moſt uncertainly with rude cavernous ſurfaces, in many places perfectly ſpungy, and no where ſhewing the leaſt brightneſs, unleſs in the white veins which are thin, ſhort, and not numerous; the red nodules contained in it are of various ſizes, from that of a filberd to that of a pin's head; they are exactly of the ſame matter and texture with the body of the maſs, only ſomething coarſer and of a deeper colour; in many parts of the maſs itſelf, but particularly in theſe nodules, it is common to ſee ſmall white particles with ſome degree of brightneſs; theſe are generally ſeparate, and make ſo many white lucid points only; in ſome other places they are ſeen concreted into larger maſſes of the bigneſs of half a pea, and theſe will be all found the very ſame matter with that of the white veins, which appears even to the naked eye a tabulated ſpar; the whole maſs is but moderately heavy, very ſoft and friable, and no more capable of poliſh than a brick. Water pretty eaſily pervades its ſtructure.

It cannot without great difficulty be made to give fire with ſteel.

It makes a ſlight efferveſcence with Aqua Fortis.

It burns to a duſky browniſh red.

Examin'd by the Microſcope, it appears a looſe cavernous ſpungy maſs, compos'd of a ſmall quantity of cryſtalline matter, mix'd in a much larger of a red earth, and by it render'd perfectly opake, and of a looſe crumbly texture; among this, as in the Quarry-Stone and all other caſes where Cryſtal is greatly debaſed, there are here and there ſeen ſpecks of looſe and pure Cryſtal, theſe are of a good water, and perfectly colourleſs and pellucid, and are but few in number, and very ſmall; but throughout the whole ſubſtance of the maſs there are diſpers'd in great quantities the white ſparry concretions, which as they are of a more or leſs complex texture, and have found more or leſs room to form themſelves into maſſes, are either ſeen in ſmall ſpecks, in plated figures, flat and reſembling flakes of Talc, or in more complex tabulated maſſes, forming ſingle thick maſſes, or the white veins, this is a perfectly white and very bright but very opake Spar; the nodules are always of a much looſer texture, as well as of a deeper colour than the reſt, and contain more and larger portions of the Spar; the conſtituent matter of the whole ſeems much the ſame, and to have been form'd nearly in the ſame manner, a quantity of cryſtalline matter ſeems to have been blended with much red earth, and to have concreted in a part of the once univerſal fluid, where at the ſame inſtant much Spar was concreting; the Spar probably was too far hardened to diffuſe and blend perfectly with the matter of the reſt, ſo fell among it in detached pieces, which either continued ſeparate or coaleſced with one another into larger or ſmaller maſſes, as they fell more or leſs diſtant from one another, or found room in the cavities or crevices of the Stone, this ſeems to have been the hiſtory of the maſs; the nodules in which are plainly no other than a ſecond coaleſcence of the ſame ſubſtances, only with more Earth and Spar, and form'd into leſs maſſes which were received into the ſubſtance of the former before it acquired its hardneſs.

It is common on the ſhores about Scarborough, and in ſome other parts of the kingdom: On Mendip-Hills in Somerſetſhire, I have ſeen it thrown up in digging, but always in ſmall maſſes of two or three inches diameter, and with the nodules proportionably ſmall.

SERIES III.

CLASS I. ORDER II. GENUS I.

PETRIDIA.

Scrupi of a plain uniform ſtructure, of no great variety of colours, and emulating the external form of Pebbles.

1. *Petridium cryſtallinum, pellucidum, decolor varium.*

Various ſiz'd, pellucid, colourleſs, cryſtalline Petridium, commonly called Pebble Cryſtal.

THIS is a very pure, elegant and beautiful Foſſil body, and is in truth no other than pure Cryſtal in this form; it is of a moſt ſmooth, even and regular texture, and ſhews not the leaſt marks of any tendency to figured concretions, or any other coaleſcence of its conſtituent matter, beſide that into the general maſs; it is of various ſizes, from that of a grain of ſand to nine, ten, or twelve inches diameter, and generally approaches to a round figure, ſometimes pretty regularly ſo, ſometimes with various irregularities in its ſurface, and ſometimes flattiſh; it is of a moſt cloſe, firm and compact texture, conſiderably heavy, perfectly colourleſs and pellucid as water, very hard, and capable of a high poliſh, and wherever it is broken, extreamly bright and glittering, tho' ſomewhat dull on its outer part from the inequalities of its ſurface, and the dirt it has taken up while newly concreted.

It very readily ſtrikes fire with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It calcines to a pure opake white.

Examin'd by the Microſcope, it appears no other than to the naked eye one extreamly bright, pure and equal pellucid maſs, without all diſtinction of parts or ſign of prior concretions.

It is found in different quantity, in almoſt all parts of the world; we have a vaſt number of them from different parts of America, very large, and of a fine water, commonly ſold among us under the name of Brazil Pebbles, they are found there on the ſhores of rivers; Germany, Italy and France, abound with them in the like places, and with us they are not uncommon both in rivers and in our gravel pits; but with us they are ſeldom very large, their general ſize here being from one inch to two in diameter.

As to the origin and formation of theſe nodules, there is no doubt but they were formed merely by a ſudden ſubſidence and coaleſcence of pure Cryſtal in theſe ſeperate quantities; where the fluid out of which they were formed was in motion, the new form'd maſſes were naturally ſoon made round; where at reſt they became flat, as many ſpecimens of this are found; and where there was a ſmaller degree of motion in it, the flat part originally its bottom remains, and its other parts acquire an irregular but ſomewhat roundiſh figure, as is the caſe in many others; let it not appear improbable to any, that Cryſtal which in a proper quantity of fluid, and that in a proper ſtate, and with the other neceſſary accidents would have form'd regular concretions, and become pure ſprig hexangular Cryſtal, as the matter of all theſe nodules evidently would have done, has in theſe, from the want of the proper circumſtances, and hurry of its ſubſidence and coaleſcence, form'd this irregular and miſſhapen maſs; the analogy between no two ſets of natural bodies is ſo great as between Salts and Cryſtals; and we may by many different ways, and particularly by the different manner of evaporation, or in other words, ſeparating the fluid that kept the ſolid bodies of theſe Salts ſuſpended, make them concrete either into their own natural and regular forms and figures, or into rude, irregular and miſ-ſhapen maſſes: Nature herſelf alſo without our aſſiſtance, affords us the ſame variety of forms in theſe bodies, and when we have ſeen her diſpoſe common Marine Salt, whoſe natural concretions we know to be into cubic, parallellopiped, or pyramidal maſſes, according to the degreee of heat uſed in the evaporation, into immenſe rocks and miſ-ſhapen maſſes in the ſalt-pits of different countries; and ſee that ſubſtance which we know would in its natural ſtate concrete into ſmall maſſes of theſe determinate figures, form'd into large parcels of a clear, homogene and pure body, bright and pellucid as Cryſtal itſelf, as we every day ſee it in Sal Gem; why ſhould we heſitate to believe, ſhe can by the ſame means form that Cryſtal which ought to be in regular columns, into maſſes of no determinate ſhape, nor form'd of primary concretions of that figure, when we ſee the Sal Gem in like manner compos'd of none, but like the cryſtalline nodule one ſimple concretion, tho' we know what its determinate figure is, and can by ſolution and cryſtallization ourſelves form it into thoſe its natural concretions.

I have been the more particular on this analogy, as the formation of Pebble Cryſtal is one of the unattempted ſubjects of the Foſſil kingdom, and the various figures this Salt aſſumes according to the various accidents in its formation, will prove a uſeful analogy in ſome caſes hereafter.

2. *Petridium cryſtallinum*, *ſemi-pellucidum*, *purpuraſcens.*
Purple, *ſemi-pellucid*, *cryſtalline Petridium.*

This is a very beautiful Stone, of a ſomewhat rough and unequal texture, but very firm and compact, of a ſmooth, even and regular ſurface, of very various ſize, but generally between one inch and four in diameter, and of a roundiſh or ſomewhat flat ſhape; it is conſiderably heavy, of a dead and diſagreeable yellowiſh white on the outſide, but when broken appears of a fine amethyſtine or reddiſh purple, very bright and glittering, and of a rude irregular ſurface; the colour is not perfectly or equally diffus'd thro' the whole maſs, but lies in it in form of blotches, or ſometimes of veins, but is generally in ſuch quantity as to give a general glow thro' the whole maſs, and make appear on a ſlight view purple throughout; it is of very conſiderable hardneſs, tho' ſomewhat leſs than the precedent, and is capable of a very good poliſh.

It very readily ſtrikes fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It calcines to a pale fleſh colour.

Examin'd by the Microſcope, it appears a very elegant maſs, of a fine clear water, and very pellucid, tho' leſs ſo than the former; it appears as perfectly homogene in its white parts as that, but not like it one ſmooth continued maſs, but a ſomewhat disjoin'd and compreſs'd one, and ſeeming to have ſuffer'd ſome violence while in the act of coaleſcing; its purple ſpots and variegations are diffus'd in a beautiful irregularity thro' it, and are plainly ſmall quantities of an elegant deep red ochreous earth, which render the parts where they are moſt frequent, much leſs pellucid than the reſt.

The origin of this ſeems to have been evidently from a ſudden ſubſidence and coaleſcence of the Cryſtal it is compos'd of, which probably catch'd up a little of an ochreous earth, ſuſpended in the fluid it ſunk thro', and which after its ſubſidence, and before its perfect coaleſcence, has evidently ſuſtain'd ſome cruſh or ſhock. This is ſo far from being peculiar to this Stone, that it is the caſe in all of this Claſs, except a very few of the pureſt and hardeſt; and has probably been from a general compreſſion, whether the effect of a general attraction, or any other cauſe, which taking place while the whole was in the act of concreting, cou'd not act ſo uniformly and equally on this, where there was earthy matter with the cryſtalline, as on thoſe where there was cryſtalline matter alone, as in the former inſtance; but has irregularly preſs'd together the already half harden'd matter, and broke the continuity, tho' by ſmall and imperceptible cracks at once in a million of places: This cou'd not but be the effect of a compreſſion given in theſe circumſtances, to a not perfectly pure, nor yet perfectly harden'd maſs; an accurate view of the Stone itſelf, or of any of the other ſpecies of the ſame kind, plainly confirms it, for they all appear of a half disjointed ſtructure, and as it were a ſomewhat ſhattery maſs, and to this, in many of them, is owing their want of tranſparency. It is moſt plainly ſo in this, for it appears very bright, tho' but moderately pellucid to the naked eye; and pieces of it may be pick'd out free from the red matter, and leſs affected by the compreſſion than the others in general, which plainly are as pure and pellucid a Cryſtal, as the fineſt either of the Pebble or ſprig kind.

This is found ſometimes in rivers, and ſometimes in gravel pits. I have ſeen of it from Germany and Bohemia, very beautiful, and have pick'd up ſome ſpecimens of it, not much leſs ſo in the gravel pits about London.

3. *Petridium cryſtallinum, niveum, hebes.*
Snow-white, opake, cryſtalline Petridium.

This is an almoſt perfectly opake, but an extreamly beautiful Stone. It is very ſmooth and even in its ſtructure, and of an extreamly firm, cloſe and compact texture. Its ſurface is always perfectly ſmooth, even and regular; its ſize is very variable, but generally between a quarter of an inch and two inches; and its ſhape ſometimes round, but moſt commonly oval and flattiſh: It is conſiderably heavy, of a chalky whiteneſs on the outſide; but when broken, of a perfect ſnow white, and remarkably bright and ſhining. It is compos'd of no aſſemblage of firſt concreted particles, but is one pure, equal, and homogene maſs; the matter which gives it its whiteneſs and opacity, being perfectly and equally diffus'd thro' its whole maſs, and having ſubjected it, tho' in only a ſlight degree to the effects of the compreſſion before-mention'd in the general coaleſcence of maſſes of this kind. It is of very great hardneſs, and capable of an elegant poliſh.

It readily ſtrikes fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It calcines to a more opake maſs, without any change of colour.

Examin'd by the Microſcope, it appears a very beautiful maſs, of a fine cryſtalline matter, every where clouded with an admixture of a fine white earth, diffus'd equally thro' it, and of the compreſs'd figure of all the impure cryſtalline nodules, but like the reſt, plainly not made up of any before concreted Granules, or other determinate figur'd particles.

The origin of this is evidently the ſame with the former, and the white matter that debaſes the Cryſtal, plainly no other than a white bole, or ſome very fine white clay.

It is common in the gravel pits in Norfolk, and I don't remember to have met with it in any quantity in any other place; I have ſeen a few ſpecimens of it on the Scarborough ſhores.

4. *Petridium cryſtallinum, hebes, albidum, carneum, vel flaveſcens. The opake, whitiſh, reddiſh, or yellowiſh cryſtalline Petridium, commonly call'd red, white, and yellow ſparry Pebbles.*

This is a Foſſil than which nothing is more common, and yet nothing has been more miſtaken as to its nature and origin. Its variations of colour owing to accidental admixtures of reddiſh or yellowiſh earth, have made it often divided into different ſpecies, tho' theſe are admixtures it is ſcarce ever perfectly free from, and often has them all indiſcriminately in the ſame maſs; but what is an error of much more conſequence, its compreſs'd configuration within natural to all the impure cryſtalline nodules, approaching in ſome degree, on a careleſs view, to the ſhattery texture of ſome of the Spars, has made it univerſally miſtaken for a Foſſil of that Claſs; and they have now among the gentlemen engag'd in theſe ſtudies, the common name of ſparry Pebbles, tho' they are in reality nothing of the pebble kind, nor have the leaſt grain of Spar in their conſtitution.

The whitiſh, yellowiſh and reddiſh maſſes of this kind, make but one ſpecies, and are all to be deſcrib'd in the ſame words. It is a rude, irregular, and conſiderably opake maſs, of a moderately firm and compact texture, and ſmooth ſurface, but ſubject to very frequent and numerous cracks; theſe are uneven, irregular, and often very long; they ſometimes go far into the body of the Stone, but are more frequently almoſt entirely ſuperficial. It is very various in ſize, we have of it in England, from the ſize of a pea, to ſix or ſeven inches diameter, and in Germany and ſome other places, there are much larger maſſes of it. In ſhape it generally approaches to roundneſs, tho' it is ſcarce ever any thing like regularly ſo; often it is flattiſh, and when of a different figure, frequently retains the flat ſurface which was its bottom in the original ſubſidence. It is conſiderably heavy, and generally of the ſame colour without and within, which is an opake, dull white, ſtain'd variouſly and irregularly with a yellowiſh or reddiſh matter beſide, which is ſometimes equally diffus'd thro' the maſs, and ſometimes lodg'd in ſpots, blotches, or irregular veins; varieties of this kind ought all to be preſerv'd, and make a pretty figure in a cabinet, but are not to be deſcrib'd as different ſpecies of Foſſils; it is dull on the outſide, but ſomewhat bright and gloſſy when broken, and ſhews more of the compreſs'd, or apparently ſhattery texture than any other of this Claſs. It is of a moderate hardneſs, and capable of a tolerable poliſh.

It readily gives fire with ſteel.

It will not make the leaſt effervescence with Aqua Fortis.

It burns to a reddiſh white.

Examin'd by the Microſcope, it appears a compreſs'd maſs like the others of this kind, but much more plainly ſo than any of them; and its ſtructure will, if carefully view'd, be found to convey great inſtruction as to the formation of the other ſpecies of its kind, as the things before-mention'd, as ſcarce diſtinctly viſible, are in the more compreſs'd ſtructure of this moſt plain and evident; this is more opake, and more colour'd than any of the others, therefore it is more debas'd by earth; and according to the rule before laid down of the earth in theſe maſſes, hindering their uniting equally in the act of compreſſion, during the time of their coaleſcence, and therefore occaſioning the cracks and irregularities of the maſs; this having more earth, ought to be more affected in that manner, and accordingly we find it ſo, none having ſo looſe, or ſo plainly diſunited a texture from the compreſſion as this; the ſolution of continuity in the maſs, occaſion'd by the ſame force, was alſo a thing only in a manner infer'd from the principles, and ſuppos'd there; but in this coarſer ſpecies we ſee it moſt evidently even to the naked eye, and in many of the red vein'd maſſes, the cracks between the disjointed parts that compoſe the whole, are very wide and conſpicuous, and generally fill'd up with the red earthy matter, and making red veins in the ſpecimen.

One ſubſtance thus frequently, in reſearches of this kind, explains another, and a general and attentive obſervation of nature in the different ſtages of perfection in the ſpecies of the ſame Genus, will afford that conviction, that all the reading in the world, or all the ſyſtems the brighteſt Genius could form in the cloſet, could never lead to.

I have obſerv'd of theſe maſſes in general, that they were form'd by a ſudden ſubſidence and coaleſcence of their conſtituent matter; which in a fluid in a ſtate of reſt, or nearly ſo, remain'd in its place, and naturally became a flat maſs; in a fluid in violent motion it was roll'd about, and by that means thrown into a more or leſs regular roundneſs during the time it was hardening; this as a bare conjecture carries no improbability with it, but in this ſpecies it is carry'd into obſervation and plain truth; ſuch ſpecimens of this as are flat, and have according to this hypotheſis lain quiet at the bottom, ought to be found at this day with ſmooth ſurfaces, and they are ſo; on the contrary, thoſe which were, when half harden'd, roll'd into a roundneſs, could not but (according to the degree of already acquir'd hardneſs, and the purity or foulneſs of their compoſition) be found roll'd into a thouſand ſuperficial or deeper cracks, and they are conſtantly found ſo, and ever more or leſs crack'd, according to their greater or leſſer purity; a familiar experiment will prove that this could not but have been the effect of the rolling them about while half concreted or harden'd, for any powder made into a ſtiff paſte with water, and roll'd into a ball between the hands, will ever be found full of irregular cracks and cavities on its ſurface, and thoſe of different depths, and exactly in all particulars reſembling thoſe on theſe Stones.

They are found of all the colours in the gravel-pits on the plough'd fields, and on the ſhores of rivers throughout the kingdom.

5. *Petridium ſaxeum, pumicoſum, albido flaveſcens.*
Yellowiſh-white, pumicoſe, or ſpungy Petridium.

This is a rough, irregular, and perfectly opake maſs, approaching to the nature of ſome of the harder Quarry Stones, and generally, but erroneouſly, ſuppos'd to be no other than the fragment of ſuch; it is in reality a true, diſtinct, and genuine Foſſil; it is of an uneven, and very rude but conſiderably firm texture, all over full of numbers of ſmall cavities, which make it reſemble a ſpunge or pumice, of a rough, uneven, and cavernous or ſpunge-like ſurface, of a very irregular and uncertain ſhape, and ſeldom approaching much to roundneſs, and in general of from half an inch to two inches diameter, tho' there are both much larger and much ſmaller met with at times; it is but moderately heavy, and of a more or leſs yellowiſh-white colour, and perfectly deſtitute of brightneſs, both on its outer ſurface, and where broken, and equally cavernous and ſpungy within and without, by which it is diſtinguiſh'd from the two following ſpecies, which are porous on their outer ſurface only, but perfectly ſolid within; it ſeems compos'd of no viſible Gritt or Granules, but an irregular congeries of cryſtalline matter, debas'd with a large admixture of a whitiſh and yellowiſh opake ſubſtance; it is conſiderably hard, but will take but a very bad poliſh. Water eaſily gets into its pores.

It ſtrikes fire with ſome difficulty with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a pure white.

Examin'd by the Microſcope, it appears a perfect petrified ſpunge, conſiſting of a mere reticular ſubſtance, the cavities of which occupy a much greater ſpace than the interſtitial ſolid matter. It is plainly compos'd of a debas'd Cryſtal, ſome of it whitiſh or yellowiſh, and perfectly without form, and opake, and other parts of it more pure, ſemi-pellucid, of a whitiſh caſt, and form'd into pretty regular, oblong, angular bodies, evidently columns of Sprig Cryſtal; among theſe there are alſo yet another kind, which are opake, oblong, but cylindrical, not angular; and theſe are all hollow, repreſenting many tubes or ſlender pipes, as we ſhall hereafter ſee is often the caſe in Spar; theſe various particles may be eaſily ſeen to cohere very firmly where they come into contact, therefore they all obtain'd their hardneſs at the ſame time, but they touch in ſo few places, that the general coheſion of the Stone is much leſs than that of many others; it is evident from the whole, that the matter of this Stone ſubſided at once, and concreting together, and ſhrinking one parcel of it from another, according to its different purity, form'd the looſe and ſpungy maſs we find it; the Microſcope and other trials eaſily determine it to be of no ſpecies of the Quarry Stone, but a genuine Foſſil of itſelf.

It is common in the Gravel-pits about London, and in all other parts of the kingdom.

6. *Petridium cryſtallinum, poroſum, albidum, durius.* *Hard, porous, whitiſh, cryſtalline Petridium.*

This is a rude, irregularly ſhap'd maſs, of a very rough, cavernous, and ſpungy ſurface, but much leſs porous than the former ſpecies within; it is conſtantly diſtinguiſh'd alſo by a number of irregularly diſpos'd veins ſcatter'd over its ſurface; theſe are ſome broad, others narrow, and are often variouſly interwoven with one another; they always ſtand up in ridges alſo above the ſurface of the reſt of the Stone, are of a much purer ſtructure, and always more ſmooth and leſs cavernous than the ordinary ſurface; often when that is very full of pores, theſe have none at all; the whole maſs is of a conſiderably firm texture, of various ſizes, from one inch to four, five, or ſix in diameter, and generally flat; ſome are found roundiſh, but there has evidently been much rolling about while they were moiſt, to bring them into that form, and ſuch are always full of cracks on the ſurface, the others never, which is a farther ſtrong proof of what I have before obſerv'd, as to the ſhape of theſe nodules; it is naturally of a fair white, but not unfrequently ting'd with a faint red, or pale yellow, it is compos'd of no viſible Gritt or Granules, but one ſmooth maſs, form'd into a cavernous ſubſtance by the receding of its parts from one another in concreting; it is conſiderably heavy, very hard, and when broken ſomewhat bright and gloſſy in all parts, but particularly in its veins, which are plainly of a much more cloſe, compact texture, and much purer than the reſt of the maſs. Water pretty readily pervades its ſtructure.

It freely and eaſily ſtrikes fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a pure, or elſe a ſomewhat reddiſh white.

Examin'd by the Microſcope, it appears a very beautiful object; it is very bright and pellucid, of a fine cloſe texture, and in its veins of a hardneſs and luſtre almoſt equal to pure Cryſtal; theſe are compact and firm, but the reſt of the ſubſtance full of irregular cavities, evidently made no other way than by the ſhrinking of the maſs in various degrees in its concretion; the more earthy parts ſhrinking almoſt into nothing, while the others have held their bulk and figure more regularly; wherever the former were, there muſt therefore be afterwards greater or ſmaller cavities.

The different degree of ſhrinking in the different parts of the ſame maſs, is alſo finely exemplified in the other parts of this Foſſil; the veins ſtanding ſo much above the reſt of the ſurface, and that's being cavernous, becauſe more impure while they are ſmooth and even becauſe purer, plainly ſhews, that a greater and more irregular ſhrinking is neceſſarily the caſe in more impure matter, than in purer. There is no doubt but the whole original ſurface of theſe, and other of the now ridg'd maſſes of this kind was plain and equal; but that the matter of them being of different purity, that which was hardeſt and fineſt kept its place more regularly, while the ſofter and more impure, ſunk from it in the general ſhrinking in the coaleſcence, and left it in ridges and in form of veins. Dr. Woodward has imagin'd this ſtructure to be owing to the effect of the water departing from the earth at the end of the deluge, and by its violent motion waſhing theſe hard bodies into form, as we ſee the waves on the ſea ſhores do; and ſuppoſes the veins being harder to have reſiſted the water, while the ſofter intermediate ſpaces were worn away and in part waſh'd off by it; but I am afraid this will appear to an accurate enquirer but little ſatisfactory; ſince had this been the caſe, the intermediate ſpaces which had been thus worn by the water, muſt have been ſmooth and in a manner poliſh'd, as we ſee all the rounded and worn bodies on the ſea ſhores are; and the ſtubborn and uncouth veins naturally rough, whereas we find juſt the contrary; for the veins are ſmooth from their purity making them coaleſce more equally in the general hardening of the maſs, and the intermediate ſpaces are rough, cavernous, and irregular, from the inequality of their ſhrinking; owing to the impurity of their mixture.

Theſe maſſes are common in all our gravel-pits.

7. *Petridium ſaxeum, albido griſeum, hebes.*
Greyiſh-white, opake, ſtony Petridium.

This is a ſtone of little beauty, but of a very cloſe and compact texture, of a ſmooth, polite, and even ſurface, except that it is like ſome of the former Species, ſubject to many ſuperficial cracks of various ſize; from one inch to a foot or more in diameter, and in ſhape either roundiſh or flat; when roundiſh, it is always full of theſe ſuperficial cracks; which when flat, it generally is free from; and commonly when ever ſo much rounded, it carries a flatneſs in ſome one part, which has been its bottom at the time of its original ſubſidence. It is of a whitiſh or greyiſh colour, perfectly opake and dull both on its ſurface, and when broken, and ſeems compos'd of no viſible Gritt, but one ſmooth uniform maſs of a cryſtalline matter, debas'd by a large admixture of a white or grey clay. It is very heavy and of conſiderable hardneſs; water cannot at all enter its ſtructure.

It ſtrikes fire tolerably readily with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a pure white.

Examin'd by the Microſcope, it appears an even, homogene maſs, of a very pleaſing colour, and faint degree of tranſparency, but without any glittering or gloſſy brightneſs.

It is common in the gravel-pits about London, and elſewhere.

8. *Petridium arenarium, lucidum, friabile, albiſſimum.*
Friable, ſhining, white, arenaceous Petridium.

This is a very ſingular and extraordinary maſs, and is of no little uſe in giving us an idea of the origin and formation of ſome kinds of ſtone. At the ſame time that I prov'd the great improbability of the Strata of Loam, according to the vulgar opinion being ſometimes turn'd into ſtone; I gave in one of the quarry ſtones, an inſtance, however, in what manner mere ſand might ſometimes be the origin of whole Strata of that body; what was there inſtanced in a fine ſtone of Strata, is here the caſe alſo in a Nodule, a ſmall maſs of matter detach'd from all others, and concreted in form of a Pebble, or other ſmall and ſeparate Foſſil; for as that among the ſtones of Strata, the moſt of all approach'd to genuine ſand; ſo this ſpecies does among the Nodules, being in reality no other than a congeries of fine, white, cryſtalline ſand, juſt cohering together in form of a ſolid maſs.

It is a rough irregular maſs, of an extreamly looſe and friable texture, of a tolerably ſmooth, equal, and regular ſurface to the eye, tho' ſomewhat rough to the touch; of an irregular, but generally ſomewhat compreſs'd ſhape, and ſeldom much tending to roundneſs, and in ſize from one to ten, twelve, or more inches in diameter. It is conſiderably heavy, of a very pure, fine, and bright white, and extreamly glittering and ſparkling where freſh broken. It is evidently compos'd of a quantity of a pure white ſand cohering together but in a very ſlight degree, and immediately reducible into looſe ſand, by crumbling between the fingers. It is of no hardneſs, the ſlighteſt blow breaking it into a multitude of pieces, and a little ſtronger one upon a ſmall piece often abſolutely deſtroying the appearance of a ſtone in it, and reducing it to a heap of plain white ſand. Water eaſily pervades its ſtructure, but does not at all affect the coheſion of its particles, nor carry off any thing with it in paſſing; but going from it as clear and pellucid as it was put on.

It freely gives fire with ſteel, when ſtruck ſo as not to be broken to pieces by the blow.

It will not at all ferment with Aqua Fortis.

It burns to a pale fleſh colour.

Examin'd by the Microſcope, it appears an elegant congeries of beautiful cryſtalline white ſand; every Granule of an oblong and angular form, and the ſeveral particles or Granules cohering wherever they come, into contact, which however, is but in few places. It is evident, that this owes its origin to mere ſand, which happening to fall together while yet moiſt and ſoft, cohered naturally wherever the Granules touch'd one another while in that ſtate. It is common to find coarſe lumps of ſand in form of ſoft ſtone, in the ſand-pits about London and elſewhere; but theſe owe their coheſion to a very different cauſe; they contain a conſiderable quantity of clay, and are in truth no other than maſſes of dry and harden'd Loam; this is eaſily prov'd by throwing a piece of one of them into water, where the water immediately becomes thick and turbid, diſſolves and waſhes off the clay that ſerv'd as a cement to the maſs; and the ſuppoſed ſtone falls to pieces, mouldering into a looſe ſand, and a ſoft clay. In the other caſe of this ſtone, water has no effect; it may remain there ever ſo long without imparting the leaſt colour to the water, or being at all affected in its coheſion; whence it is very evident, that its coaleſcence is owing to its own particles, not to thoſe of an extraneous matter. The Microſcope alſo ſhews this with ſufficient plainneſs: and as this coheſion is but ſlight, the ſand it ſo eaſily crumbles into, does not ſeem at all mutilated, or ſhew the leaſt ſign even to the Microſcope, of which were the points in which it coher'd when in form of a ſtone.

It is no very common ſpecies. I have found it in large nodules in ſome of our tile clay-pits, particularly that near the Black-Lion in Oxford road; and remember it in the gravel-pits in Northamptonſhire. It is extreamly like the Quarry-Stone of that country, before deſcrib'd under the name of Arenarium Splendidum Albidum Fragile; and as in many other like inſtances, may be erroneouſly ſuppos'd by ſome, to be only fragments broken off from the Strata of that ſtone; nothing is a more frequent error, in that in general excellent author Dr. Woodward, than this of ſuppoſing things which we find thus looſe and in the ſhape of nodules, to have been fragments of ſtrata. Many of the Engliſh Jaſpers hereafter to be deſcrib'd, he took for fragments of marble of various kinds, not conſidering that there were in reality no ſuch marble as theſe in the world; and what is yet much more convincing, that theſe bodies were a perfectly different ſubſtance, and had no one of all the characters of marble in them. As theſe therefore, and a thouſand other of the like ſeparate maſſes were unqueſtionably form'd ſeparate, and not accidentally made ſo; ſo this has unqueſtionably been, ſince the very force of that water departing at the end of the deluge, to which that author attributes ſuch great things muſt, by its toſſing this violently about among other bodies, have ſoon reduced it to looſe ſand, and could not poſſibly, after rolling it about among other hard matter to great diſtances, and for a long time together; as is his ſuppoſition in regard to theſe detach'd maſſes, have left it in the form of a ſtone. Upon the whole, that great Cataſtrophe has undoubtedly made great and abundant changes in the Foſſil world; but the misfortune of attributing too much to it, is the occaſion of peoples diſputing even the plaineſt truths in regard to its effects; and that author, by attempting to prove that it has done every thing, has made a thouſand people believe, that it has done nothing at all.

9. *Petridium cryſtallinum, albicans, flavo punctatum.*
White, cryſtalline Petridium, ſpotted with ſmall yellow dots.

This is what has by ſome authors, from the reſemblance of its ſmall yellow ſpots to the Semen Santonium of the ſhops, been call'd the worm-ſeed ſtone.

It is a ſomewhat rude and irregular maſs, of an unequal and ſomewhat rough, but conſiderably firm, compact, and hard texture, and of a very ſmooth and equal ſurface for the moſt part; tho' ſometimes it is found full of irregular cavities. It is generally of a pretty regularly orbicular or oblong ſhape, a little compreſs'd, and thicker in the middle than at the edges, and uſually of about three or four inches in diameter. It is conſiderably heavy and very hard, of a tolerably pure white in colour, tho' ſometimes not without a caſt of pale brown among it, and very remarkably ſpotted with ſmall yellow dots, not exceeding the ſize of a ſmall pin's head in breadth; and tho' ſometimes of three or four times that length yet generally roundiſh; theſe are of a very bright pale yellow, and make an agreeable variegation in the colour, and give a ſingular and odd appearance to the ſtone. It is but of a duſky and dull colour on the outſide, but is very bright and glittering when broken, and is evidently compos'd of a large and angular Gritt, but that ſo well join'd and cloſely compacted together, as in few places to leave any traces of its determinate and natural figure; water does not at all pervade its ſtructure.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a pale red, the yellow ſpots becoming much redder than the reſt.

Examin'd by the Microſcope, it appears like the former, a congeries of a very fine, bright, and white ſand, but with this difference, that as in that ſpecies the Granules came into contact only in a few points, from their having been perfectly form'd before they fell together, tho' not perfectly harden'd; theſe cohere in almoſt their whole ſurfaces, this gives the hardneſs to the maſs; and this is entirely owing to the Granules having fallen together and concreted into this maſs, when yet newly form'd and perfectly ſoft and moiſt. As each of theſe Granules is evidently the effect of a ſingle concretion, not a ſucceſſive application of matter as in the large cryſtals, nothing is more eaſy to conceive, than that their falling into one maſs while new form'd, might entirely obliterate their natural figure, and cruſh them into contact in all parts, and in a manner into one ſmooth maſs. Such is evidently the caſe here, for notwithſtanding the confus'd ſituation and compreſs'd ſtate of moſt of the particles, many of them yet ſhew they have been originally of a determinate figure, and keep in the maſs the manifeſt traces of oblong and angular Granules. The yellow ſpots in this ſpecies, are ſo many ſmall lumps of a very hard, pale yellow ochreous earth. The Microſcope very plainly ſhews this, as they appear of an opake, looſe, and ſpungy ſubſtance, and plainly an earth, not a ſtone, or any thing of that nature. Their burning to a fair red, is alſo another proof of their being true ochre; but the greateſt of all is the boiling the ſtone in water for a conſiderable time, by which means I have always procur'd a water faintly ting'd with yellow, and evidently containing ochre, and have found all the places where the ſpots had been on the ſurface of the pieces of the ſtone, ſo many dirty cavities, with generally ſome of the yellow matters indeed remaining fix'd to their bottom and ſides, but without the far greater part, which had in all of them been waſh'd off by the water in the boiling.

It is common on the ſhores of Yorkſhire, and is ſometimes, tho' not frequently, found in the gravel-pits about London and elſewhere.

10. *Petridium ſaxeum, albido fuſcum, hebes.*
Whitiſh-brown, dull Petridium.

This is a ſomewhat ſofter maſs than any of the precedent. It is of a looſer texture and more crumbly than the reſt, but of a tolerably even and regular ſtructure. It is much larger than the generality of the bodies of this claſs, being ſeldom found in maſſes of leſs than a foot diameter, and often in much larger. Its ſhape is ever broad and flat, and its ſurface furrow'd with deep longitudinal cracks in great number, interſected with many ſmaller tranſverſe ones. It is of a very pale brown; in many ſpecimens approaching toward whiteneſs, and in ſome faintly ſtain'd with yellowiſh or reddiſh, perfectly dull and opake on the ſurface, and when broken, is generally ſeen ſhattery and full of cracks, ſome larger and ſome ſmaller; the narrow ones often empty, the wider generally fill'd up with regular cryſtals; theſe look very bright and glittering, but the reſt of the ſubſtance perfectly opake and dull. It ſeems to the naked eye one ſmooth homogene maſs, it is conſiderably heavy, leſs hard than moſt of this claſs in the maſs; and when reduced to ſmall pieces, may be crumbled to powder between the fingers, eſpecially in its looſer parts; for the ſame maſs has often its ſeveral parts of different degrees of hardneſs and coheſion. Water very readily pervades its ſtructure.

It does not eaſily ſtrike fire with ſteel, unleſs in its harder parts.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a pale fleſh colour.

Examin'd by the Microſcope, it appears a very beautiful maſs, compos'd of an extreamly minute, but very regular bright and beautiful cryſtalline Gritt; the particles all of a fine water, perfectly pellucid, of an oblong angular figure, coming into contact but in few places, but cohering wherever they do ſo; and their interſtices are fill'd with a pale browniſh earth in ſome places, and are left perfectly open and empty in others; in the former parts the ſtone is more firm, in the latter more ſhattery. There is no doubt, but that this was form'd exactly after the manner of many of the ſtones of ſtrata, with this only difference, that as there is a vaſt quantity of the matter ſubſided at once in a large bed, here ſmaller parcels of it form'd diſunited Nodules.

It is found in many places in England. At Hampſtead-Heath near the upper end of the town, they never fail finding large quantities of it when they get to fourteen or fifteen feet deep; it is all in flat maſſes, which lie in an even horizontal direction, and frequently contain large pieces of petrified wood; the whole ſubſtance of which is ſo perfectly ſtony, that its external lineaments, knots, &c. can alone determine it ever to have been ſuch.

11. *Petridium cryſtallinum, durium, albido cæruleſcens.*
Blueiſh white, hard, cryſtalline Petridium.

This is a very beautiful and hard maſs, of a ſomewhat coarſe ſtructure, but very firm, compact and cloſe, of a ſmooth, even ſurface, of various ſize, but generally from three to nine or ten inches in diameter, and of a flattiſh ſhape, but ſomewhat approaching to roundneſs. It is of a faint lead colour'd and whitiſh caſt, dull and duſky on its outſide, but when broken, very fair, bright, gloſſy, and in thin pieces ſomewhat pellucid; it breaks with an uneven ſurface, and is often mark'd in different places with faint reddiſh ſpots. It is very heavy, of great hardneſs, and capable of a fine poliſh. Water does not at all enter its texture.

It very readily gives fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It calcines to a pure white.

Examin'd by the Microſcope, it appears a congeries of cryſtalline matter, debas'd by a ſlight admixture of a greyiſh or pale blueiſh clay, and ſeems to have been ſtop'd in the act of forming into regular Cryſtals, many faint attempts towards hexangular columns, being viſibly blended in the general irregular maſs; the whole is very bright and gloſſy, but not perfectly pellucid. It has plainly been form'd of an admixture of clayey and cryſtalline matter, compreſs'd together by a general coaleſcence, juſt when it was beginning to ſhoot into regular figures.

It is very common on the ſhores of Italy, France and England; we find it alſo ſometimes in digging at conſiderable depths: I have more than once ſeen it thrown up in large maſſes on Mendip Hills, Somerſetſhire.

12. *Petridium ſaxeum, lucidum, durius, albo-ſubfuſcum.*
Browniſh-white, hard, ſhining Petridium.

This is a very ſingular and very beautiful maſs; it is ſomewhat coarſe, but of a firm, cloſe, and compact texture, of a rude, irregular ſurface, and generally of about ſix or ſeven inches in diameter; tho' neither in this, or any other ſpecies of this claſs do I mean to determine of any certainty, the ſize of the ſeveral ſpecimens of it; they are often in different places of all the different ſizes, from that of a pea to vaſt maſſes; all that I mean is, to give ſome general idea of that which ſeems their moſt uſual ſize; this is generally in broad and flat maſſes of a duſky white, with ſome ſlight admixture of a pale brown, of a dull hue on the outſide, but when broken appears conſiderably bright and glittering, of an unequal ſurface, and plainly compos'd of a Gritt of fine, obtuſely angular, and ſometimes roundiſh particles of great brightneſs, held together by a ſurrounding maſs of a not much leſs bright ſubſtance; beſide theſe it is alſo frequently ſpotted with a multitude of black and green ſpecks, not larger than very ſmall grains of Sand; it is conſiderably heavy, but moderately hard, and capable of a very bright poliſh. Water does not at all pervade its ſtructure.

It will not readily give fire with ſteel.

It ferments violently with Aqua Fortis, but is in part only diſſolv'd by it.

It calcines to a pale fleſh colour.

Examin'd by the Microſcope, it appears a very beautiful object, a great number of Granules of a pure cryſtalline matter diſcover themſelves in it; they are of various figures, but moſtly of the ſame ſize, and all of a fine water; it cannot properly be ſaid that the Stone is compos'd of theſe, for they ſeldom come into contact with one another, and do not cohere when they do, but are immers'd in, and held together by the general matter of the maſs, which is a very pure gloſſy Spar of the complex tabulated texture; theſe Granules are lodg'd in, between and among the concretions of this maſs in all directions, and beſide theſe it is frequently variegated with ſmall and very bright green, cryſtalline and black arenaceous particles.

There is no room to doubt but that all theſe were taken up by the ſparry maſs while moiſt and ſoft, and ſo became immers'd and bury'd in it at its final coaleſcence; they are, however, eaſily ſeparable from it again, and their different nature diſcover'd by Aqua Fortis; 'tis a pleaſing ſight to obſerve a lump of it thrown into a ſmall quantity of this menſtruum, which as it moves about, and its ſparry matter, which was the cement of the whole, diſſolves, drops from it every moment, theſe black, white, and green particles, none of which the Acid has the leaſt effect on; but in the end the texture of the whole is deſtroy'd, the Spar, which was the band of union, diſſolv'd, and wholly taken up in the acid menſtruum, and the other particles left looſe in form of a variegated Sand; a longer ſtanding in the menſtruum ſhews that the green particles are highly impregnated with copper, for the menſtruum becomes of a ſtrong verdigreaſe colour.

It is found in Derbyſhire, and ſome other counties; it ſometimes lies on the ſurface, but is more generally met with at conſiderable depths.

SERIES III.

CLASS I. ORDER II. GENUS II.

JASPIDES.

Scrupi emulating the appearance of the finer Marbles, or ſemipellucid Gems.

SECT. I. The White JASPERS.

1. *Jaſpis marmorea, albiſſima, lucida, durior: Quæ Lapis Nephriticus albus Authorum.*

Hard, ſhining, white, marbly Jaſper, commonly call'd the white Nephritick Stone.

THIS is a very bright and valuable Stone, of a fine, compact, and firm texture, and ſmooth gloſſy ſurface; it is of very various ſizes, but ſuch pieces as are large enough to cut cups, or other veſſels out of, are of very great value, and very ſcarce; its more ordinary ſize being from one to two inches in diameter; it is very irregular in ſhape, ſometimes round, ſometimes flattiſh, but more generally of the irregular figure of our ordinary Flints, and naturally of a pure and elegant white, and very bright and pellucid; it is ſubject to many accidental variations in this however, and is found ſometimes ting'd with a blueiſh, which makes it of a deep pearl colour, and is eſteem'd a beauty in it, rather than a defect, and ſometimes with a faint yellowiſh, or honey colour, which much debaſes its value. It is very fair and bright, even on its outſide, and has much of a marbly look, but when broken is very bright and gloſſy, of a fine ſmooth ſurface, and even texture, and more reſembles flinty than marbly matter. It is conſiderably heavy, of very great hardneſs, and capable of an elegant poliſh. Water cannot at all enter its texture.

It readily ſtrikes fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It calcines to a ſnow white.

Examin'd by the Microſcope, it appears one pure ſimilar ſubſtance, not compos'd of any ſeparate concretions, but one ſmooth aſſemblage of cryſtalline matter, ſlightly debas'd with a fine earth.

It is found in many parts of America, ſometimes among the various maſſes of the green Nephriticus, hereafter to be deſcribed, and ſometimes growing to the maſſes of that Stone. It is generally found on the ſhores of rivers, as particularly of the great river of the Amazons, and ſeveral of the larger rivers in New Spain. It is alſo found on the ſurface of the earth, and in digging in the adjoining provinces, but generally in ſmall maſſes; it is plainly harder than the green Nephriticus, and takes a much finer poliſh.

It is among the people of America in great eſteem as an amulet, worn on the arm or other parts of the body, to remedy the pains in caſes of the Stone and Gravel; and they firmly believe that it cauſes the perſon who wears it to void great quantities of the calculous matter by urine without pain. I wiſh I could ſay they were the only people who placed faith in ſuch remedies; we know it here on another occaſion, having cups and ſmall vaſes of a glorious brightneſs, and fine poliſh made of it; theſe have an appearance between that of Marble and Cryſtal, and are extreamly beautiful.

Sect. II. The Green and Greeniſh JASPERS.

1. *Jaſpis duriſſima, læte, vireſcens.* *Hard, fine, green Jaſper.*

This is a bright, ſemi-pellucid, and very elegant Stone. It is remarkably fine and ſmooth, both on its ſurface and when broken; of a cloſe, compact, and very regular texture, generally of a ſmooth and equal ſurface, and when crack'd or rough with prominences and cavities, as it ſometimes is, the ſides of thoſe inequalities are ever ſmooth and polite. Its ſize is too various to be determin'd with any degree of certainty; there have been found of it maſſes of many foot diameter, and nothing is more common than to meet with it of the bigneſs of a horſebean; if any thing can be call'd its more uſual ſize, it muſt be that of four or five inches diameter; its ſhape is not leſs variable than its ſize; 'tis often roundiſh, often flat, and not unfrequently ſhap'd as irregularly as the ordinary Pebbles, and that from the very ſame cauſe. Its colour and texture are what make its determinate characteriſticks. It is of a ſtrong and very beautiful green, often unmix'd, but if ever vein'd or ſpotted, it is found ſo only with white, and that rather in thoſe irregular variegations we call clouds, than in either determinate ſpots or regular veins. It is ſomewhat bright and gloſſy on the outſide, but when broken, exhibits a ſmooth ſurface, very bright and gloſſy, and ſeemingly of a texture between thoſe of Flint and Marble; and in pieces not too thick is moderately tranſparent, tho' ſomewhat leſs ſo than the purer of the Agate Claſs, and held againſt the light, is of a pure, pleaſing and unmix'd green. It is conſiderably heavy, of very great hardneſs, and capable of a high and elegant poliſh.

It readily ſtrikes fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a whitiſh grey.

Examin'd by the Microſcope, it appears of a fine, ſmooth and even texture, very bright and pellucid, and of a true emerald green; its white parts, where there are any, appear much brighter, and more pellucid than the reſt, but are not as the white veins of many Stones evidently are, of a different matter or ſtructure from the reſt, but merely parts of the Stone, not ting'd with the matter which has diffus'd itſelf thro', and given its colour and ſomewhat of opacity to the reſt.

It is very plain that this is no other than a congeries of cryſtalline matter, debas'd by an admixture of earthy particles, and partly by them, and partly by the ſuddenneſs of its general coaleſcence, prevented from ſhooting into its own natural and regular figures; this particular, is, however, obſervable in it, that after its being debas'd by an intimate union with particles of earth, it has received a ſtrong and beautiful tinge from metalline particles, probably thoſe of copper, which have not, however, in all inſtances affected it equally all over, for ſome ſpots of it we find are often white; had it been a green earth that gave it this dye, ſo much in quantity, of ſo opake a ſubſtance, as cou'd give this ſtrong tinge, muſt have made the whole maſs much more opake, and the ſpaces where it did not take place, muſt have remain'd pure Cryſtal: This, however, is not the caſe, for the Stone is very pellucid, and its uncolour'd parts clouded with ſomething that debaſes them greatly from the nature of pure Cryſtal: I have generally obſerv'd, that a white fine Earth of the Bole-kind ſeems to have been a ſubſtance frequently taken up into, and debaſing the nature of Cryſtal; it was ſo in the white Stone laſt deſcrib'd, and has been evidently originally ſo in this, a fine white earth has been taken up into the Cryſtal at the time of its concretion, and afterwards dy'd with a tinge of green: This earth alone has determin'd the Stone to be a Jaſper, by rendering it in its degree opake, and determining it to concrete in a large miſ-ſhapen maſs: without this earth the matter muſt have concreted in ſmaller parcels, and more regular forms; and the white had been Cryſtal, the green a baſtard Emerald.

It is found in Ægypt, in ſome parts of Africa, in Tartary, China, and many parts of the Eaſt Indies, and is eſteem'd in many places as a great remedy in fluxes, hæmorrhages, &c. worn as an amulet. We ſometimes ſee ſmall vaſes, &c. of it, of an extream hardneſs, and moſt elegant poliſh.

The Antients in general have deſcrib'd the Jaſper, but that ſo indeterminately and uncertainly in a number of different ſpecies, that it is not eaſy to collect any certain knowledge from them; if they ſeem to have had any one ſpecies more peculiarly known by the name of Jaſper without addition, it ſeems to be this; the Antients in general conceiv'd the firſt and beſt kind of Jaſper to be green, and nam'd that colour firſt in their enumerations of its kinds, and ſeem'd to give the preference to it: and that green Jaſper was evidently this very ſpecies: Dioſcorides begins his account of the Jaſpers with ſaying, ſome are of the colour, and approach to the nature of the emerald; and Pliny begins his with *Viret & ſæpe trans lucet Jaſpis*; theſe ſeem to have been the fix'd characters of the fineſt Jaſper among the antients, and they well agree with this ſpecies, which as has been already obſerv'd, if it had not the admixture of the white earth, wou'd be a ſort of Emerald.

I have already obſerv'd, that the ſpots of this Stone, which are without the green, are a whitiſh muddy Cryſtal; theſe are not uncommon in ſome places in all the Jaſpers, and are ſometimes, tho' rarely found ſeparate; that is, there are ſome pieces of this Jaſper wholly undy'd with green; the antients ſeem to have found theſe more plentifully than we now do, and have made a new ſpecies from them, not conſidering that they were no way different, but as the uncolour'd veins of the green and white maſſes, and were in reality accidental varieties only of the green Jaſper; this is the ſecond kind deſcrib'd by Dioſcorides, who very nicely characterizes it, ſaying, it reſembled Cryſtal, and was of the colour of a thick water, and Dioſcorides and Pliny mention a kind as bad, which were *cryſtallo ſimiles*. The cuſtom of wearing the Jaſpers as amulets is very old; Pliny ſays, *Totus vero oriens pro Amuletis geſtare eum*; ſome from a wrong pointing in the copies, wou'd connect this with the ſubſequent ſentence in that author, *Quæ ex iis ſmaragdo ſimiles*, &c. and by that means confine his account to this ſpecies only; but Dioſcorides gives us an early teſtimony of their being thus us'd, and ſays, that all the kinds were equally worn on theſe occaſions, λέγονται δὲ πάντες ἐιναι φυλακτήρια περίαπτα. Very early indeed it was, that this ſort of ſuperſtition gain'd credit, and we have the misfortune, from the eſteem of the Eagle Stone, and two or three other inſtances of this kind, to find that it is not banter'd out of the world yet.

2. *Jaſpis mollior, obſcure virens.*
Soft, duſky green Jaſper.

This is a Stone of much leſs beauty and value than the precedent, and ſeems not to have been at all known to the antients. It is very ſmooth and fine, of a cloſe, compact and equal texture, a very ſmooth and even ſurface, and of various ſize, but generally between two and four, or five, inches diameter; its ſhape is almoſt univerſally flat, and where it any thing approaches to roundneſs; its ſurface is ever proportionably full of thoſe ſuperficial cracks I have before taken notice of in ſome of the impurer cryſtalline nodules, and determin'd to be the effect of the rolling the maſs about before perfectly harden'd. It is of a duſky green, ſometimes darker, ſometimes paler, but never with any degree of brightneſs; often it has a caſt of blueiſhneſs, and ſometimes of brown: it is ſeldom variegated, but when it is, 'tis ever with white only, or with that and a paler ſhade of its own colour; when broken, it ſhews a ſomewhat irregular and uneven ſurface, and has ſcarce any brightneſs. It is conſiderably heavy, and but moderately hard, ſcarce any thing harder than the common white Marble; it cuts very eaſily, but will not take a good poliſh. Water is not able at all to pervade its ſtructure.

It will not readily ſtrike fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a pale grey.

The tryal with ſteel is like that with Aqua Fortis, a good general method of making a gueſs at the ſtructure of a Foſſil, ſince Cryſtal and Spar are the baſis of a great part of theſe bodies; and Cryſtal will give fire, while Spar will not; theſe, however, tho' good and ready means, are not to be depended upon as certain, eſpecially ſingly, but they may often be made to aſſiſt and explain one another; this and ſome other before mention'd inſtances, ſhew, that a cryſtalline Stone, as this aſſuredly is, may, when debas'd with a great quantity of earth, refuſe to give fire with ſteel; but then its refuſing alſo to ferment with Aqua Fortis, explains the cauſe of its not ſucceeding in that tryal.

Examin'd by the Microſcope, this appears a plain, equal and regular ſubſtance, compos'd of no Granulæ, or primarily concreted particles, but one uniform maſs; it has very little brightneſs, and ſcarce any tranſparency, except juſt about the edges, where it appears faintly pellucid, and of a poor whitiſh or blueiſh green. It is evidently a congeries of cryſtalline matter, highly ſaturated with a dead earth, and like the other Jaſpers, colour'd by ſome metalline admixture.

It is very common in Germany, Italy, Bohemia, France and England. It is ſometimes found on our river ſhores, ſometimes on the ſurface of the earth, and ſometimes, but that leſs frequently in gravel pits; there is much of it on the ſhores of the iſland of Guernſey, from whence it is brought among other maſſes, to be us'd in the pavements of the ſtreets of London; we are not without inſtances alſo of the oriental Jaſper, and many other valuable Stones in our pavements, which have, as ballaſt of India ſhips, or by one accident or other been brought among us.

3. *Jaſpis durior, cæruleo virens, punctis & lineis ſanguineis variegatus. Heliotropium Antiquorum.*

Hard, blueiſh green Jaſper, with red variegations. The Heliotrope of the Antients, and Jaſper Blood-ſtone of the Moderns.

This is a very beautiful Stone, and one that has been long known in the world; it is the Heliotropium, Plin. 790. Salmaſ. in Solin. 245. Cæſalpin. 125. Boet. 257. Marbod. de Lap. P. 54. Aldrov. Muſ. Met. 895. & Aliorum.

It is a very fine, ſmooth and elegant maſs, of an extreamly firm and compact texture, of a ſomewhat rude and irregular ſurface, in its general ſize between two and ſix inches in diameter, tho' often much larger or much ſmaller, of a perfectly indeterminate ſhape, but generally approaching ſomewhat to round or flat, tho' unequal with prominences and cavities in many places. Its colour is a fine ſtrong green, ſometimes pure and unmix'd, and ſometimes with a conſiderable admixture of blue. It is moderately tranſparent in thin pieces, but much leſs ſo than the green Jaſper, before deſcrib'd, and is always vein'd, clouded and ſpotted with a fine bright red; this is its moſt obvious character, and it has obtain'd among our Jewellers the name of Blood-ſtone; it is perfectly dull on the outſide, and but little gloſſy when broken, tho' it affords a tolerably ſmooth and even ſurface. It is very hard, tho' ſomewhat leſs ſo than the plain green oriental Jaſper, and takes a very fine and elegant poliſh.

It readily ſtrikes fire with ſteel.

It will not make the leaſt effervеſcence with Aqua Fortis.

It burns to a duſky grey, vein'd with a ſomewhat dark or browniſh red.

Examin'd by the Microſcope, it appears a ſmooth, even ſubſtance, of a flinty texture, and moderately pellucid, and variegated with the matter of the red Jaſper, hereafter to be deſcrib'd, in form of ſmall irregular ſpots, diſtinct and ſingle in ſome places, but in others cluſter'd in great numbers together, and making long clouds or veins.

It is evidently a cryſtalline maſs, like the two former debas'd by earth, and ting'd by, probably, cupreous particles; but contains ſuch a proportion of earth as makes it of a middle degree of hardneſs, tranſparency and beauty between the two before deſcribed: and has in its ſubſidence collected, or while yet ſoft and unconcreted, receiv'd into its maſs many ſmall aggregates of the particles of the red Jaſper, and ſhews them in form of ſpots and other variegations.

It is common in Ægypt, Africa, and the Eaſt-Indies, and is frequently annexed to other Jaſpers, and ſometimes is the covering, or as it is commonly call'd, the bed or matrix of the emerald. It is work'd into cups, vaſes, ſnuff-boxes, and other ornamental things, and makes a very beautiful figure.

The antients all agree in their deſcriptions of this ſtone; and tho' by its name, and the reaſons imagin'd for its receiving it, we might ſuppoſe we at preſent knew not the ſtone they underſtood by that word, yet their deſcriptions are ſo plain, that we cannot be miſtaken in it. Pliny ſays, that it was *porracei coloris, ſanguineis venis diſtincta.* And all the writers after him have in a manner copied his words; and the old poet Marbodæus ſays of it,

Hanc nunc Æthiopis, nunc Cyprus & Africa mittit
Sanguineis aſperſum guttis ſimilemque Smaragdo.

When we are convinc'd, as we muſt be, by a general review of the deſcriptions the antients have left us of the ſtone they knew by this name, that it was the very ſame with that we now call ſo: We may with ſomething the more probability of ſucceſs ſet about finding the origin of its ſo remarkable appellation. From the accounts ſome give us of this, we might be apt to infer in ſpite of conviction indeed that we have not now the ſtone; the before-mention'd Marbodæus has given us a moſt romantick accounts of its effects as the occaſion of its name:

Ex re nomen habens eſt Heliotropia Gemma,
Quæ ſolis radiis in aqua ſubjecto Batillo
Sanguineum reddit mutato lumine ſolem,
Eclipſimque novum terris effundere cogit:
Denique poſt modicum vas ebullire videbis,
Aſpergique foras ſubitæ ſcaturiginis imbrem
Ut ſit cum nimbos diſtillat turbidus aer,
Imbres de cœlo vocat aſtringitque ſerenum;

From this author ſeveral others have collected their accounts. Aldrovandus has quoted the four firſt of theſe lines, and many others have taken the ſenſe of them in proſe; but if we conſider them cloſely, we ſhall find them no more than the effect of a warm imagination in poetry, improving upon Pliny's plain, tho' as it has come down to us much corrupted account of it. This is indeed the original account; and from this are all the others. Pliny's words are, *Cauſa nominis quoniam dejecta in vas aquæ fulgorem ſolis accendit, ſanguineo repercuſſu; eadem extra aquam ſpeculi modo ſolem accipit deprehenditque defectus ſubeuntem lunam oſtendens.* Theſe have been ſtrangely miſunderſtood by many, but their plain ſenſe certainly is, that this ſtone is call'd the Heliotrope, that is, the ſtone which alters the common effects of the ſun; becauſe whereas every one knows, that the ſun may be look'd at ſafely, and eclipſes ſeen in a veſſel of water; but by the naked eye, or a reflecting ſpeculum, his brightneſs cannot be endured. This Stone, on the contrary, if made into a ſpeculum, ſhews the ſun without the aſſiſtance of water, ſo robb'd of its brightneſs, that it may be ſafely look'd on: and eclipſes contemplated, and the moon ſeen paſſing, *&c.* but if thrown into water, it inverts the uſual properties of things in regard to the ſun's brightneſs, and ſhews you its image there ſo full of brightneſs as not to be endur'd. *Fulgorem ejus accendit, ſanguineo repercuſſu,* words not only plainly conveying the author's idea, but ſurely, however it has happened that they have been miſunderſtood, peculiarly expreſs and ſtrong.

4. *Jaſpis duriſſima, albidovirens. Lapis Nephriticus Authorum.*
Hard, whitiſh-green Jaſper. The Nephritick Stone of Authors.

This is the Lapis Nephriticus Boet. de Boot. 259. de Laet. 81. Lapis Indicus, Nephriticus Aldrov. Muſ. Met. 706, Lapis Oripendulus Geſner 83.

It is a very valuable and beautiful ſtone, of an extreamly fine, compact and firm texture, and of a very ſmooth, tho' unequal ſurface; its prominences and cavities being all even and polite; it is of various ſizes, but generally between two and five inches in diameter, ſmaller than theſe are alſo very common, and we have accounts of much larger. Its ſhape is perfectly irregular, rarely either round or flat, but protuberant and unequal in the manner of our ordinary flints; its colour, tho' very various in degree, is ever compos'd of only green and white: ſometimes theſe are blended in various proportions, and being perfectly diffus'd through the whole maſs, make only a deeper or a paler ſimple green; at other times they are ſeparate, the white appearing in diſtinct clouds or ſpots, and ſometimes mix'd only with a part of the maſs, it leaves the greater quantity of a deep green, and ſhews itſelf in pale green veins and other variegations. I have ſeen almoſt endleſs varieties in this Stone, merely ariſing from the different mixture of theſe two colours, ſome ſpecimens of a fine deep green, approaching to the Praſius in colour, purity, and hardneſs: for this is a conſtant rule, that the deeper the colour of this Stone, the purer and harder it is, others have had the white diſtinct, and others partly diſtinct, partly blended with a ſmall ſhare of green, and made up of fine variegations: it is ſmooth and polite on the ſurface; and when broken, gives a flinty ſurface, very bright and gloſſy, and is in thin pieces tolerably pellucid; it is very heavy and of a hardneſs more than equal to the oriental Jaſper, and in its purer pieces not inferior to the Praſius, either in that or beauty; but in poliſhing it is inferior to them all; no art can ever give it the luſtre of even Stones much inferior to it in all reſpects; but it ever appears dull, and as it were, greaſy on the ſurface.

It readily gives fire with ſteel.

It will not at all ferment with Aqua fortis.

It calcines to a pale-grey.

Examin'd by the Microſcope, it has a ſingular appearance different from that of all the other Jaſpers; for tho' it be one even maſs like the reſt, it is eaſy to diſcover in it a cloudineſs plainly occaſion'd by the earth in its compoſition, which is leſs perfectly mix'd than in the other Jaſpers; and even ſeems of a different kind from that of all the others. This cloudineſs is not, as might be expected, greateſt where the Stone is deepeſt colour'd, but always leaſt in thoſe places, and the paler parts ever are the more opake; that greaſineſs viſible on the ſurface of this Stone when poliſhed, is by the Microſcope ſeen on all the ſurfaces of the maſs, and is evidently owing to the imperfect admixture and unctuous quality of the earth contain'd. It is plainer here than in any of the former inſtances, both that this earth is the thing that debaſes the Stone from the purity it would otherwiſe have, and keeps it from being a pellucid gem, and that the colour of the Stone is not owing to this earth, but to another admixture; ſince the Stone is ever ſofter where the greater quantity of the earth has made it more opake and whiter, that is, paler colour'd; and where there is little or none of it is much more ſtrongly colour'd, and yet harder and more pellucid, and is in ſome ſpecimens and parts of ſpecimens that I have ſeen, little inferior to the Praſius.

It is found on the ſurface of the earth, and in the beds of rivers, in many parts of America, particularly in the Spaniſh ſettlements, and is there eſteem'd an impurer kind of emerald by the natives; who according to Ximenes, call it *Iztliayotli quetzaliztli*, a word expreſſing that meaning: it however very widely differs from the Emerald, Praſius, and all the gem claſs by its admixture of earth.

This is one of the moſt eſteem'd amulets of all the foſſil kingdom; and we have a thouſand ſtories of its being a powerful diuretic externally worn: and Ximenes, Monardes, De Laet, and many others relate amazing ſtories of its effects, in ſending off gravel, *&c.* by urine, from their own knowledge. The Indians form theſe Stones into figures of birds, beaſts, fiſhes, or other forms; and had once a mighty faſhion of wearing them hung to their lower lip; whence Geſner calls the Stone the Lapis Oripendulus. I flatter myſelf we ſhall as ſoon ſee this uſe of it introduc'd here among the ladies, as the other among the phyſicians.

5. *Jaſpis duriſſima viridiflaveſcens. Nephriticus ſubflava Authorum. Hard, yellowiſh green Jaſper. The yellowiſh green Nephriticus of Authors.*

This is the Lapis Nephriticus ex viride ſubflavus de Laet. 82. Lapidis Nephritici Species ſubflava Boet. 261. & aliorum.

It is a more dull and opake, and leſs beautiful, tho' more variegated Stone than the former; it is of a very firm, compact and cloſe texture, of a ſomewhat ſmooth, even and gloſſy ſurface of various ſizes, from one inch to twelve or more in diameter, and generally of a flattiſh ſhape; its colour is properly a mixture of green and yellow, as that of the former is of green and white, and theſe are mix'd in the different ſpecimens one meets with, with an equal uncertainty, ſometimes they are diffus'd perfectly together, and make one uniformly yellowiſh green maſs, ſometimes they are abſolutely diſtinct, and in ſpots and veins, and ſometimes imperfectly blended, and make variegations of great elegance and beauty. The Stone is, tho' ſmooth and gloſſy on the ſurface, much more ſo when broken, and exhibits a flinty texture, but with a remarkable coarſeneſs in the yellower parts compar'd with the reſt, and is in the whole leſs pellucid than the former kind, and in itſelf is much leſs ſo in theſe yellow than in the purer green parts; it is conſiderably heavy, and very little inferior in hardneſs to the former ſpecies, like it alſo ſhewing a greaſineſs on the ſurface when poliſh'd.

It very freely ſtrikes fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a pearl colour, or ſomewhat blueiſh white.

Examin'd by the Microſcope, it has the ſame ſort of cloudineſs with the former, and is made dull by it throughout, the green parts not having leſs of it than the yellower, the ſurfaces like it alſo plainly ſhew the ſame greaſineſs that the Stone does when poliſh'd; this ſhould ſeem therefore a maſs compounded in a greater degree than the former, and to have the cryſtalline matter debas'd by the white earth, colour'd by the metalline tinge, and foul'd in many places by a light ochre beſides; it is upon the whole, however, a very beautiful Stone, tho' leſs ſo than the former; it is found in the ſame parts of America, as alſo in Germany, Bohemia, and ſome other of the European nations: I have heard alſo that the true green Nephriticus is ſo, but have found all that I have yet ſeen call'd ſo, to be only accidental nodules of one of the green Marbles, fermenting with Acids, and giving all the characters of that, and none of the Jaſper claſs.

6. *Jaſpis marmorea, cæruleo virens, cinereo & nigro variegata.*
Blueiſh-green, marbly Jaſper, variegated with grey and black.

This is a Stone well known among the American nations, and mention'd by ſome of the writers on theſe ſubjects, Ximenes, De Laet, &c. and generally, from ſome accidental variations, ſubdivided into ſeveral different ſpecies; they eſteem it of the Nephriticus kind properly enough, but certainly err in dividing it into more ſpecies.

It is a very beautiful Stone, and ſeems to the eye of a middle nature, between the oriental green Jaſper, the green Nephriticus, and the Ophites Marble; to this laſt its diſpoſition of ſpots and external figure give a great general reſemblance, tho' it has in reality no character of the Marble claſs, but is a genuine Jaſper.

It is of a very fine, cloſe, firm, and compact texture, of a rude irregular ſurface, in ſize generally of between four and ſix inches diameter, and moſt frequently, tho' not conſtantly of a longiſh or oval ſhape, and ſomewhat flattiſh; its colour is always a very pleaſing one, very uncertain in degree, and therefore often emulating a various appearance, but always made up of a mixture of green, grey, and blue; its green is generally but pale, its grey ſometimes very deep, ſometimes tending to whitiſhneſs, tho' I never once ſaw a ſpot of true white in this ſpecies; and its blue varies from lead colour to that of the Saphire; theſe differences alone might give us an amazing variety in the colour of the various maſſes of this Stone; but if we conſider at the ſame time what will be the reſult of their various admixtures in greater or leſs quantities, and in the more or leſs perfect diffuſion of them thro' the maſs, we muſt conclude its variations in that reſpect can be little leſs than infinite; theſe colours in ſhort are ſometimes blended into one uniform admixture, and make the maſs of a ſingle colour the reſult of all; ſometimes they are leſs perfectly mix'd and diſpos'd in clouds, ſpots, and veins, and it is impoſſible to determine when a ſpecimen is or is not of this ſpecies, except by carrying in mind that this ſpecies always has all theſe colours; for ſo it ever has in ſome degree, as far as I have yet ſeen, and that it never has in the matter of its maſs any other but theſe colours; beſide theſe, in its general ſubſtance, or what may be call'd the baſis in the more variegated pieces, it has, however, veins and ſpots of a ſulphur colour, and others of a deep velvet black; the matter of theſe colours is ſomewhat coarſer than that of the baſis of the Stone, is never diffus'd among it, but is plainly in this what the red ſpots and veins are in the Heliotrope, ſeparately concreted ſmall maſſes of a different Stone, receiv'd into the Jaſper before its general and final coaleſcence; this ſpecies has more brightneſs than either of the other Nephritici on its outſide, and when broken exhibits a very ſmooth, fair, and gloſſy ſurface; it is very hard, and takes a fine poliſh, but is not without the greaſineſs on the ſurface common to all the Nephritici after poliſhing, tho' it poſſeſſes it in a leſs degree than any of the others.

It readily ſtrikes fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a reddiſh white.

Examin'd by the Microſcope, it appears a very beautiful maſs, very bright, leſs greaſy on the ſurface than either of the former, and of all the other ſpecies in its various parts, the moſt variouſly tranſparent; it no where equals in this reſpect the green Jaſper, or ſome others of this claſs, but is in itſelf ſo very various, that it appears in the different parts as different from itſelf as an Emerald from a Pebble; its black and yellow ſpots are evidently a different ſubſtance from the reſt, and are loaded with ſuch a ſuperior quantity of earth, that they are perfectly opake in moſt inſtances.

The ſhores of the great river of Amazons in America abound with this; the natives eſteem it leſs than any others, and with ſome reaſon, for it will not take the ſame poliſh in its yellow and black parts, as in the reſt, and if they happen to be plentifully interſpers'd in the maſs, they greatly take off from the beauty of the ſtone, as I have more than once obſerv'd in ſome that I have ſeen poliſh'd here. People ſay alſo, that this ſpecies is found in many parts of Germany. I can only obſerve in regard to this, that as is too often the caſe in other things, all the ſpecimens I have ſeen from thence, call'd by this name, were erroneouſly ſo call'd, and were no other than natural fragments of the Ophitæ, anſwering all the characters of Marble, no one of Jaſper.

7. *Jaſpis duriſſima, cinereo virens. Quæ Lapis divinus Pierre du Jade, & Pierre divine Authorum.*

Hard, greyiſh green Jaſper. The Jade, and Divine Stone of Authors.

This is a ſtone much leſs leſs known in England than in France, where people are very fond of it. Lemery in his Dictionary calls it the Jade, and divine Stone of the author of the Parfait Jouallier; and Pomet has given it a place in his hiſtory of Drugs, under the ſame name of Jade.

It is a ſtone of little beauty in compariſon of ſome others of this claſs, but is of extream hardneſs and capable of a very elegant poliſh. It is of a cloſe, compact texture, of a very rude, irregular and unequal ſurface, very various in ſize; but moſt frequently of ſix, eight, or ten inches long, and almoſt conſtantly of an oblong ſhape. Its colour is more conſtant and regular than that of any of the Jaſpers, it being ever compos'd of an admixture of a pale grey and a pale green; it has in the ſpecimens more or leſs of the green indeed, but it ſeems ever of the ſame tinge, only in different quantities; and is ever generally diffus'd with the grey, and has no diſtinct veins of it. I never have ſeen it ſpotted with any other colour, and am apt to believe it never is ſo, but conſtantly retains its purity and regular appearance. It is but rude and dull on the outſide, but when broken ſhews a fine flinty texture, yet is but very little tranſparent; what tranſparency it has, is alſo plainly more in the green than in the grey parts, as in all the other Jaſpers. It is remarkably heavy, of a very conſiderable hardneſs, very difficult to cut, but capable of a high and very elegant poliſh.

It ſtrikes fire as freely as flint with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It changes not at all its colour in the fire, except urg'd with a very violent one; then the green is driven off, and the whole comes out of a whitiſh grey.

Examin'd by the Microſcope, it appears a pure homogene maſs, of a perfectly ſmooth texture, but more ſo in the greener parts than in the grey, and more tranſparent; theſe are therefore evidently the purer parts, and this I find a general obſervation, that the metalline tinge ſtrikes moſt freely, and moſt deeply in theſe purer and leſs earthy particles;

cles; for this ſtone like the whole claſs of Jaſpers, is no other than a maſs of Cryſtal, debas'd by an admixture of earth, and by it kept from ſhooting in its natural form.

This is found only in the Eaſt-Indies, but is there much eſteem'd, and ſent thence into many parts of the world. I have ſeen it in England, but the greateſt uſe of it is among the Turks; the handles of whoſe ſabres are generally made of it, for the greater people. It is alſo eſteem'd of uſe in medicine as an amulet worn externally in nephritick caſes; the natives in many parts of the Eaſt-Indies, have a great opinion of it on theſe occaſions. It is only found like the Jaſpers in ſeparate maſſes, but in the iſland of Sumatra, the people have found a thin ſtratum of a flinty ſtone, known in England by the name of Chert, and deſcrib'd among thoſe ſtones in the preceding pages, which they take to be the ſame ſtone; and very induſtriouſly dig it out of the rock. I receiv'd a piece of this from Mr. Smyth, and am inform'd by him, that the natives eſteem it a ſovereign remedy in nephritick caſes, and believe, while they wear it as an amulet, that no poiſon nor venemous bite can hurt them. I believe it would be of no great good to undeceive the people, ſince probably this ſtone will anſwer all their purpoſes full as well as the other.

8. *Jaſpis hebes, obſcure virens. Quæ Molochites, vel Malachites Antiquorum.*

Dull, deep green Jaſper. The Malachites of the Antients.

This is the Molochite of Pliny. v. 2. p. 782. Molochites Cæſalpin. 125. Malachites, vel Molochites, Boet. 263. Malachites Aldrov. Muſ. Met. 900.

It is a ſtone not without its beauty, tho' much inferior to ſeveral of the former. It is of a firm, compact texture, generally of a very ſmooth and even ſurface, and in ſize ſmaller than moſt of the Jaſpers are commonly found; for we have no inſtance of a ſtone truly of this kind being found of more than between two and three inches diameter. It is generally found in ſmooth roundiſh, or oval flattiſh maſſes, and is of a very ſtrong deep green, frequently purely and ſimply ſo, but ſometimes diverſified with whitiſh, and with perfectly black veins and ſpots. It is but of a dull and dead look, tho' very ſmooth and polite on its outſide, and when broken, gives a more perfectly ſmooth and gloſſy ſurface than any of the Jaſpers beſide, and has a very pleaſing green, often deeper than that of any other ſtone; but is inferior to moſt of the Jaſpers, in that it is much more opake than any; indeed it can ſcarce be ſaid to be at all tranſparent. It is conſiderably heavy, of very great hardneſs, and takes a high and excellent poliſh, without any thing of the greaſineſs of the Nephritics.

It very readily ſtrikes fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It almoſt entirely loſes its colour in the fire, burning to a pale grey.

Examin'd by the Microſcope, it appears a very beautiful maſs, of a perfectly ſmooth and even texture, much more pellucid than to the naked eye; and of a very ſtrong and lively green, but clouded all over equally with an admixture of a fine ſubtle earth. The view of this ſtone by the Microſcope, plainly ſpeaks its origin. It is evidently ſeen to be no other than a very glorious and deep colour'd green cryſtal, debas'd by adventitious earth, and by that determin'd to this figure and appearance; all the green cryſtals that we know, appearing no other than ſo many ſmall quantities of the pure matter of the Malachites of different degrees of colour concreted ſeparately, and perfectly free from the debaſing earth.

The fineſt, and pureſt ſpecimens of this ſtone, are from New-Spain; we have of it alſo from the Eaſt-Indies; this is generally harder than the American, and paler colour'd, but of leſs beauty. It is alſo found in Germany, and ſome other parts of Europe, but never equal in beauty with that from America. The antients had it from Arabia, and as it would ſeem from thence only; for no other place is mention'd by Pliny as producing it. We don't hear of it from thence at this time, but that may very probably be from the inadvertency of travellers. Pliny's deſcription is too expreſs to let us doubt, but that what we at preſent know under this name, is the very ſame with that of the antients; he ſays, *non tranſlucet Molochites Spiſſius virens, & craſſius quam Smaragdus.*

It has been ever like the other Jaſpers in high eſteem as an amulet; ſome have ventur'd to recommend it alſo internally as a purge, and it is ſaid to operate violently like antimony, in the quantity of ſix grains for a doſe. It is highly probable this may be true, ſince its deep green makes it very plain, that it contains a large quantity of copper. We have however at preſent no occaſion to have recourſe to ſuch remedies. All the antients ſpeak of its virtues as an amulet for infants particularly, imagining it had a power to preſerve them from all injuries; the good old Marbodæus ſings its praiſes in theſe words;

Infantum cunas virtute ſua Molochites
Protegit, & caſus abigit quoſcunque ferinos;
Ne teneros artus pars poſſit iniqua nocere.

But whatever eſteem we may hold this account in, his three ſucceeding lines which gives us its deſcription and place, are of ſome value.

Dat Lapidi pretium virtus cumulatu decore
Craſſum quippe virens ſimilis ſolet eſſe ſmaragdo
Hunc Arabum gentes prius inveniſſe feruntur.

9. *Jaſpis cæruleo-virens, mollior, hebes. Quæ Jaſpis Aerizuſa & Borea Antiquorum.*

Blueiſh green, ſofter, dull Jaſper. The Borea, and ſky-colour'd Jaſper of the Antients.

This is a ſtone generally accounted of the Malachites kind, but improperly as it is much ſofter than that. De Boet reckons it a Malachites, and from its diverſity of deeper or paler colouring divides it into two ſpecies, which he makes his third and fourth kinds of that ſtone; but this is being guilty of a double error. Our travellers following this author, eſteem this when they meet it a Malachite; but the antients diſtinguiſh'd more juſtly, and always call'd it a Jaſper, with various additions to its name, ſometimes expreſſive of its colour, as the Borea and Aerizuſa, and ſometimes of its country, for it was commonly known alſo among them, under the name of *Jaſpis Perſica*, *Jaſpis Cypria*, and *Japis Thermodoontica*, from the name of a river, on the ſhores of which it was not unfrequently found. It is of a very cloſe and compact, but leſs pure and firm texture than many of the other Jaſpers, of a very ſmooth, equal and polite ſurface, and in ſize generally ſmall, being very ſeldom found of beyond two inches diameter. Its ſhape is more regular in the ſpecimens I have yet ſeen and I am apt to believe in all, than that of any other Stone of this kind, it being in all I have had opportunity of examining, of an oblong form, more than twice as broad as thick, and ſeemingly of a tendency to an angular figure or evident ſquareneſs at the corners. Its colour is very various in degree, but like the reſt of the Jaſpers, it is ſo diſtinct in this, that it can never lead an accurate obſerver to miſtake its ſpecies, ſince in all its almoſt endleſs ſhades, varieties and mixture of colours, it may be ever diſcover'd to conſiſt of no other than green and blue, nor ever of either of theſe ſingly. It is ſometimes of a blue, with very little green, ſometimes of a green with very little blue: and in the different ſpecimens with all the varieties that can ariſe from a mixture of thoſe two colours, in all the various degrees of colour and ſhades of mixture. It is, however, ſingular in this, that its colours are never lodg'd diſtinctly in veins, but always perfectly diffus'd among, and blended with one another; and in no ſpecimen that I have yet ſeen ever ſpotted or variegated with any other tinge: it puts on, however, very various appearances, ſometimes in all things but hardneſs very much emulating the Malachites, ſometimes but for the want of the white and yellow variegations approaching very much to the Lapis Lazuli; and often ſo exactly counterfeiting the pale blue of the Turquoiſe, as to paſs with any one for it till cloſely examin'd. Some have indeed imagin'd the variety of this ſpecies to be the very Turquoiſe of the moderns but erroneouſly, as will be ſhewn at large in its proper place. It is conſiderably heavy, and but moderately hard, yet capable of a very elegant poliſh; it has but a dull and unpromiſing, though ſmooth ſurface; but when broken, ſhews a very even texture and agreeable poliſh.

It does not ſo readily, as many of the others, ſtrike fire with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It burns to a pale aſh colour.

Examin'd by the Microſcope, it appears an almoſt perfectly opake, but very beautiful maſs, of an even regular texture, a very agreeably bright and gloſſy ſurface, and almoſt ever is equally clouded with the earthy particles it is ſo abundantly ſated with; and which are more evident in this ſpecies than in any other of the claſs, in their mixture with the cryſtalline, for the production of the Stone.

The antients had it, as before obſerv'd, from Cyprus, Perſia, and ſome other places; we know of it only from America, (in many parts of which it is found, and eſteem'd a valuable amulet, and very beautiful gem,) and in ſome few parts of Germany; but that much inferior to the American in all things but ſize. Pliny tells us, ſpeaking of the various Jaſpers, and the places that produc'd them, *Perſæ aeri ſimilem ob id vocatur Aerizuſa talis & Caſpia eſt, cærulea circa Thermodoontem amnem*, &c. And afterwards ſpeaking of their ſeveral places in the eſteem of the world, he ſays, *Quarta vocatur Borea cælo autumnali matutino ſimilis & hæc erit illa quæ vocatur Aerizuſa.* Dioſcorides alſo well knew this ſpecies; in his account of the various kinds, he tells us there was one of a fine cœleſtial blue or ſky colour, which he calls ἴασπις ἀερίζων, and all the old writers ſeem perfectly to have known it. Orpheus mentions it as of uſe in the ſuperſtitious rites of ſacrifice, under the name of Ἴασπις ἀερόχροος, and Jaſpis aerini coloris, or Aerizuſa, is even a literal tranſlation of this:

> Καὶ γλαφυρὸν Κομίσας ἀερόχροον ἄικεν Ἴασπιν
> ἱερὰ ῥέζοι τις μακάρων ἰαίνεται ἦτορ. p. 206.

Dionyſius alſo records it in his verſes under the name of ἠερόεσσα ἴασπις. It is eaſily wrought, and makes a very beautiful figure in cups, ſmall vaſes, and other ornamental things.

10. *Jaſpis ſordide virens, albo & carneo variegatus.*
Duſky green Jaſper, variegated with white and fleſh colour.

This is a ſpecies of Jaſper, which tho' of the ſame coarſe ſtructure and opacity with the former, yet like it is not without its beauty, and deſerves the notice of our jewellers and lapidaries, much more than ſeveral things which they purchaſe at a conſiderable price.

It is a rough, coarſe, and rugged Stone, of an irregular, but very firm and compact texture, generally of rude and unequal ſurface, of very conſiderable ſize, being not unfrequently found of 13, 16, or 18 inches in diameter; in ſhape generally tending to roundiſh or oval, and always flatted in a greater or leſs degree: it is of a very agreeable mixture of colours, and affords an almoſt infinite variety in the blending, mixing, and diſpoſition of them. Its only conſtant colour is green; for this it never wants: its others, which it generally has all together in the ſame maſs, but one or other of which it alſo ſometimes wants, are a pale fleſh colour, a very pure white and a deep browniſh black; the Stone in its natural and moſt ordinary figure is compos'd of all theſe; the green for the baſis, the fleſh colour and white in thin tranſverſe veins, in ſome parts ſeparate, in others lying cloſely on one another; and the duſky blackiſh matter ſometimes in veins, but more generally in ſpots or clouds. This is the general appearance of the Stone, and in this ſtate it is very beautiful; but it is eaſy to conceive from the accidents natural to the maſſes at their formation, that out of this variety of colours much variety will at times be produc'd in the Stone. I have often ſeen of it of two greens, the white being blended with part of the green, and making it of a different ſhade, and with the other colours ſo ſparingly ſcatter'd through it, as not to be diſtinguiſhable at firſt ſight; and ſometimes the red or white will be found in ſuch large quantities as to appear the baſis of the maſs. Great care ſhould be taken in this and other ſuch Foſſils, by thoſe who are making collections, to take proper and expreſſive ſpecimens, ſince it will be eaſy in many of them to break off pieces from particular parts, which would give but a very improper idea of the whole. This is of a more promiſing ſurface than many other of the Jaſpers; its colours generally appearing in a very pleaſing variety on it, but when broken few of the Jaſpers have ſo rough a ſurface, or have ſo little brightneſs. It is, however, very hard, and though it wants brightneſs in the maſs, is capable of a poliſh ſcarce inferior to the fineſt of the Oriental or American Jaſpers, and I ſcarce know a more beautiful Stone than a well choſen plate of this when perfectly poliſhed.

It readily ſtrikes fire with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It burns to a mottled greyiſh and reddiſh maſs, with no remainder of the green.

Examin'd by the Microſcope, it appears a very opake, but very beautiful maſs; its colours are very bright and elegant, and its texture very regular, and equal in all, and leſs debas'd with earth by much than the colour'd parts of the former ſpecies: this regularity of its texture in its different parts, makes it capable of ſo equal and elegant a poliſh, as few of the impure Stones beſides will take; and its colours ſeem not ochreous as the red of the former, but purely metalline; its opacity being wholly owing to that earthy admixture, which runs through all the Jaſpers; and which, as I have frequently obſerv'd already, has nothing to do with the colours of any of them.

This is very common on the ſhores of the iſland of Guernſey, on many parts of the French coaſt, and in ſome places on our own ſhores. I have alſo ſeen of it in Somerſetſhire, thrown up in digging from conſiderable depths. What I have ſeen thus thrown up has uſually been of a rough rugged ſurface, and generally had ſharp rugged edges; what we find on the ſhores is perfectly rounded and ſmooth, being worn by the continual motion of the waves and frequent rubbing of the maſſes among one another. It is a queſtion worthy conſideration, whether the corners rounded off from theſe and the like maſſes on the ſhores of different parts of the world, may not have been the origin of ſome of the beautiful variegated Saburræ from Minorca, which have all their colours, and anſwer to all their characters.

The only uſe that this beautiful Stone is put to at preſent, is that among many others of no leſs elegance and value, it makes a part of the pavements of the ſtreets of London.

SECT. III. The Red JASPERS.

II. *Jaſpis purpurea, duriſſima, variegata. Quæ Jaſpis Roſea authorum.*

Hard, variegated, purple Jaſper. The roſe colour'd Jaſper of the Authors.

This is a very elegant Stone, and often approaches much to the porphyry in hardneſs, and in the diſpoſition of its variegations. It is the Jaſpis purpurea of Pliny 782. Jaſpis Roſea, Boet. 251. Cæſalpinus 124. It is a very beautiful and elegant Stone, and was accounted the firſt in value among the Romans; the next after this was what they accounted a different ſpecies, but what was only a variety of this very kind, with leſs of the blueiſh purple caſt; the third the fine hard oriental green Jaſper, before deſcrib'd, and the fourth the blue laſt mention'd.

This is of a perfectly ſmooth, fine, and compact texture, and generally of a rough, rude, and unequal ſurface, and perfectly undeterminable ſhape; the various pieces we ſee of it being as various and irregular as the rudeſt of our own flints. Its ſize is one great article to recommend it alſo, for it is found large enough for many uſes, which the other ſpecies, by reaſon of their ſmallneſs, never can be put to; many maſſes of it being of ten, twelve and fifteen inches diameter; its colour is very beautiful, but very various, like that of all the other Jaſpers; it is, however, eaſily reduc'd to a ſufficient certainty of diſtinguiſhing the ſpecies, ſince it is ever made up of red and blue; its varieties in the different admixtures, like thoſe of the other Jaſpers, are almoſt endleſs, but whether they are diffus'd perfectly with one another, and make an equal and uniform purple, which will vary in degree according to the different ſhades of the colours, from the deepeſt violet colour, to the paleſt Amethiſtine Spar, or whether they are disjunct, and ſeparately ſhew themſelves in the form of clouds, ſpots and veins, or are mixedly diſpos'd in both theſe manners, as is often the caſe, ſtill the two colours will be ever diſtinguiſhable by a nice eye; and as in moſt other caſes with the green, ſo here it happens with the blue, that whatever part of the Stone is moſt ſtrongly ting'd with it, is ever the moſt bright and pellucid. It is but of a dull and unpromiſing ſurface; but when broken ſhews a very bright and equal ſurface, and is in ſmall pieces moderately pellucid. Beſide its native colours this ſpecies is ſometimes variegated with ſpots or veins of others; this, however, happens but ſeldom, and when it does, is always a blemiſh, not a beauty to the maſs, ſince theſe matters are always adventitious, and much inferior to the Stone itſelf in beauty. It is conſiderably heavy, of very remarkable hardneſs, and capable of a poliſh inferior to none of the Jaſper Claſs.

It very freely gives fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a ſomewhat paler red.

Examin'd by the Microſcope, it appears a very glorious and beautiful object; its red part is much like that of the finer oriental Carnelians, but more beautifully ting'd tho' leſs pellucid; its blue, wherever found diſtinct and pure, to this aſſiſted view appears no other than an oriental Sapphire, debas'd with but a very ſmall cloudineſs, from a ſlight admixture of earthy particles; where theſe colours are mix'd, the part is plainly of a middle nature between the two, and as the blue or red have the greater proportion in the maſs, is ever the more or leſs bright and pellucid; the ſpots of other colours where they appear, are very plainly of a different texture from the matter of the Stone; and have been evidently like the variegations of the Heliotrope, ſmall concretions of a different matter, accidentally received into the maſs of the Jaſper while concreting.

We have this ſpecies from different parts of the world, but in very different degrees of purity, beauty and perfection; the fineſt I have ſeen have been from Ægypt, very beautiful ones have been brought both from the Eaſt and Weſt Indies, and ſeveral, tho' none fine, from Germany, Bohemia and Spain; I have indeed ſeen one or two ſaid to be from Spain, which were perfectly fine, but think I can be very certain they were not found there, or in any other part of Europe, but probably brought from New Spain, and their hiſtory forgot before they came hither.

The Antients had them from Phrygia and Cappadocia; Pliny gives us this account, and adds, that the blueiſh purple of Cappadocia, were leſs bright than the other ſpecies; *in Phrygia purpurea,* ſays he, *in Cappadocia, ex purpura cærulea atque non refulgens,* V. 2. p. 782. This is plainly not the caſe with the Jaſpers we now have, but as I have heard of none from the place Pliny allots to theſe; there is no ſaying whether thoſe of that country may not deviate ſo far from the common character of ours, as to anſwer his deſcription, or whether there may not be ſome error of the copies in this place.

They are in Spain frequently cut into vaſes, cups, images, and other ornaments, and are ſcarce inferior to any of the Claſs in beauty or elegance of poliſh.

12. *Jaſpis miniacea, albo variegata.*
Bright, red Jaſper, variegated with white.

This is a Stone of conſiderable beauty, but much inferior to the precedent in hardneſs, and the fineneſs of its texture.

It is of a leſs cloſe and compact ſtructure than moſt of the Jaſpers, but yet very hard and firm, of an irregular cavernous ſurface, but very ſmooth and polite in the ſpaces between the hollows, of very various ſizes, from that of a ſmall nut, to that of a man's head; and ever, ſo far as I have yet had opportunities of obſerving, of a flattiſh, round or oval ſhape; its colour is the moſt bright and pleaſant red imaginable, very much approaching to that of the Minium, or red lead of the ſhops, and tho' it is ſubject to ſome varieties of being deeper or paler, and more pure or duſky; yet, upon the whole, it is the moſt fix'd and determinate in its colour of any one of the Jaſper Claſs. Its variegations are alſo as regular and certain as the general colour of the maſs; they are ever white, or at leaſt, with very little exception, and are almoſt always diſpos'd in regular narrow veins. There are indeed inſtances of this being diſpos'd in ſpots; and this, as all other ſpecies of this Claſs, may accidentally be found mottled with extraneous matter of another colour; but this happens very rarely, and as I have already obſerv'd on ſome other occaſions, theſe extraneous and accidental variegations may always be diſcovered not to belong truly to the Stone, by their very different texture and hardneſs. It is common with the Jaſpers to have their external ſurfaces very unpromiſing, and to break with beautiful and gloſſy ones, but this ſpecies, on the contrary,

trary, is very ſmooth, polite and gloſſy externally, and breaks with a rough, irregular one, and without the leaſt brightneſs. It is alſo the moſt opake of the whole Claſs; notwithſtanding theſe diſadvantageous circumſtances, however, it cuts eaſily and evenly and well, and takes a very beautiful poliſh.

It pretty readily ſtrikes fire with ſteel.

It will not at all efferveſce with Aqua Fortis.

It burns to a ſomewhat browner and deeper colour.

Examin'd by the Microſcope, its veins appear of a pure agaty texture, and very aptly and exactly reſemble the Chalcedony, hereafter to be deſcrib'd; I have obſerv'd, that the red part of the former, even exceeded in ſome reſpects the Carnelian; the red of this ſpecies is much inferior to that Stone, and indeed, in the European ſpecimens that I have ſeen of it, is plainly looſe, open and cavernous throughout; the veins of this ſpecies ſeem of a cryſtalline matter, but ſlightly clouded and debas'd with earth, but the red part, or general matter of the maſs, ſeems very highly ſaturated with a fine and high colour'd red Ochre.

I have ſeen of it from the Weſt Indies, and from ſeveral parts of Europe: The American is greatly preferable, being only cavernous on the ſurface; whereas, that of Europe, particularly that of our own nation in the northern counties, of which it is not uncommon, is always cavernous throughout, and makes, for that reaſon, but a very indifferent figure when wrought, tho' in the ſolid parts it takes a poliſh little inferior to the American; I have ſeen much of it in Yorkſhire, on the ſurface of the earth, in gravel pits, and on the ſhores of brooks and rivers; the German is a little better than ours, being freer from holes, and fuller of veins, and the German cabinets are full of toys made of it; but the American, of which we ſee ſome among our London jewellers, is infinitely ſuperior to either, as being moſt elegantly diverſify'd with veins, having thoſe veins of a much purer and brighter white, and being abſolutely free from all cavities within.

13. *Jaſpis albo-purpurea, hebes.*
Dull, purple and white Jaſper.

This, tho' conſiderably opake, is yet a very elegant Stone. It is of a coarſe and irregular, but notwithſtanding that, of a very firm and compact texture, of a rude, cavernous and unequal ſurface, but very ſmooth and polite in the plainer places between the cavities; in ſize from four to ten inches in diameter, and always, as far as I have yet had opportunities of obſerving, of a flatted, roundiſh, or oval ſhape. Its colours are white and purple, but not without ſome variations in themſelves, the purple frequently going off into a pale red, and the white into a yellowiſh or blueiſh colour; theſe colours are ſo equally diffus'd thro' the maſs, that it is not eaſy to ſay, which is the baſis or ground colour, and which the variegation; and tho' they never blend among one another, ſo as to make a mixt colour between them, yet nothing is more common than for the one to be found broken into ſmall pieces, and mix'd in the form of little ſpots in the maſs of the other; there are ſometimes alſo inſtances of the two colours forming regular and even veins; but this is not common, and this irregular union of them is the general ſtate of the maſſes we find. It is often of but an unpromiſing ſurface, but when broken ſhews a very pleaſing variation of colours, and is conſiderably bright and ſparkling; it has alſo this variation not unfrequently, that a maſs ſhall be found all purple, except a ſmall plate of white on its upper ſurface, in regard to its original ſite, and as often maſſes all white, except for ſuch a plate of purple, and ſome inſtances I have ſeen of ſpecimens of it all purple, or all white; it is obſervable, that thoſe of one colour, with only a ſtreak or ſmall plate of the other at one end, have it always on that ſurface, which has lain originally uppermoſt in the earth, whether it be purple on white, or white on purple, but the former is much the more frequent caſe; when maſſes of it are found, however, perfectly white or red, they are not at all likely to miſlead any one into miſtaking them either for the purple Jaſper, before deſcrib'd, or the white Nephriticus, or any other of this Claſs; for all theſe hitherto deſcrib'd are of an even flinty texture, and break with a ſmooth and gloſſy ſurface; this, on the contrary, being much more ſaturated with earth, has been leſs able to reſiſt the compreſſion which happens to all theſe Stones at their final coaleſcence, and has by that means had its matter when half concreted, cruſh'd together, and broken into a number of fragments, which now lie like thoſe of our opake cryſtalline nodules, commonly call'd ſparry Pebbles, or in ſome degree reſembling the ſhattery Spars. It is conſiderably heavy, of very great hardneſs, and capable of an excellent poliſh.

It very readily gives fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a browniſh red and pure white.

Examin'd by the Microſcope, it affords a very different object from any of the former Jaſpers; its white parts appear of a dull blueiſh or yellowiſh white, rarely of a more pure or perfect one, of a ſmooth, even, and regular texture; they are ſomewhat gloſſy, and moderately tranſparent, and ſeem a cryſtalline matter debas'd by a very conſiderable quantity of earth: its red or purple are of a fine gay colour, but perfectly opake, much more highly ſaturated with earthy matter than the white, and by it render'd of a looſer and ſomewhat porous texture, they ſeem indeed more than half compos'd of a ferrugineous red ochre, of the nature of the red ſtony ochre of the Eaſt-Indies before deſcrib'd, and to have no more of the cryſtalline matter beſtow'd on them, than juſt what was ſufficient to hold them together in this form: by this examination of them one would wonder how they ſhould be capable of ſo good a poliſh as they are, tho' a cloſe inſpection of a poliſh'd plate of this Stone, will ſhew theſe do not take a brightneſs or ſmoothneſs equal to the white.

It is evident from a view of the ſeveral maſſes one meets with of this Stone, that its differently colour'd matter concreted originally about the ſame time, and ſubſided from among the univerſal fluid, ſometimes together, as in the more common, and more beautifully variegated maſſes of the Stone, ſometimes ſeparately, and ſometimes a ſmall quantity of the one alone, upon a larger quantity of the other, which had firſt ſubſided pure; this, if it fell while both were ſoft, wou'd run itſelf among the other into veins, if when the former maſs was harden'd, it wou'd lie on its upper ſurface but half coherent, and eaſily ſeparated, as we always ſee in the ſpecimens before mention'd, of one pure colour, with only a plate of the other on their ſurface.

It is common in Italy, Germany and England, handles of knives and other toys are made of it in many places; we have it brought from Italy into England, and tops of ſnuff-boxes are ſometimes cut out of it. Our people concern'd in theſe things, have not yet found out that it is common in our own kingdom; about ſeven miles from Briſtol I have ſeen much of it lying on the ſurface of the earth, and thrown up among gravel; on many of our ſhores it is common, and I once or twice have ſeen maſſes of it of two or three pound weight, thrown up at the gravel pits on Hampſtead Heath, of which I have ſpecimens not inferior to thoſe of the ſame Stone brought from Italy.

SECT. IV. Brown JASPER.

14. *Jaſpis duriſſimus, pallide fuſcus, venis purpuraſcentibus.* *Pale-brown, hard Jaſper, with purple veins.*

This is a ſtone of much the ſame ſtructure with the precedent, but conſiderably more beautiful. It is of a moderately fine, but very compact and hard texture, and of a perfectly ſmooth, even, and polite ſurface; in ſize generally between two and four inches in diameter, and commonly of an oblong flattiſh ſhape; its baſis or ground colour is a very agreeable pale whitiſh brown, and its variegations are conſtantly diſpos'd in pretty regular horizontal veins, and always of a fine deep purple, very much reſembling red port wine in colour, or of a tolerably pure white; it breaks with a rough uneven ſurface, and has very little brightneſs in the browniſh, and much leſs in the red parts; theſe red veins are in reality ſo many ſubſidences or different thin ſtrata, falling on the firſt beds of the brown matter, and ſubject to other beds of it falling on them again. I have obſerved, from the firm coheſion of the different ſubſidences of the black and yellow parts of a formerly deſcrib'd ſpecies, that the matter of thoſe different ſtrata, as they may not improperly be call'd, ſubſided very quick one quantity upon another, and fell together while very ſoft and moiſt: and according to the ſame rule, which is a very unerring one, it is plain, that the different ſediments which form this ſtone, ſunk at more conſiderable diſtances of time ſome of them than others, and all at a time when the former ſubſidences had obtain'd a conſiderable degree of hardneſs; for theſe no where cohere ſo firmly as in that ſpecies, tho' they lie ſeemingly very cloſe in ſome places; and it is common to find the red and brown parts of the maſs, not to have originally coher'd at all, but in the general coaleſcence of the ſtone to have ſhrunk from one another, and left vacant horizontal ſpaces, ſometimes very narrow, at others, of an eighth or tenth of an inch diameter; where theſe crevices have been continued to the ſurface of the Stone, and divided that as well as the internal parts of it, they are frequently found fill'd up with clay, ſand, ochre, or whatever elſe was the ſubſtance they lay among. Where they affect only the internal parts of the Stone, and the ſurface remains whole, as is more commonly the caſe, they are ever found full of ſmall, but regular Cryſtals, of perfect pellucidity and a fine water. I have inſtances of both theſe accidents in the ſame Stone: in ſome ſpecimens there have alſo been many more of theſe cracks, which are ſince fill'd up with a more impure Cryſtal ſaturated with a white earth, and not unaptly reſembling the white native veins of ſome of the other bodies of this claſs, and not eaſily diſtinguiſhable from its own in thoſe ſpecimens where it has them. It is of very great hardneſs, and capable of a good poliſh.

It readily ſtrikes fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a greyiſh white, with brown, and very white veins, where the red and white ones were in the maſs.

Examin'd by the Microſcope, it appears as the reſt of this claſs, a Cryſtal loaded with earth, but has this peculiarly different from the former, that as its dark veins ow'd their colour to an ochreous earth, and were conſequently more opake than the reſt of the Stone; theſe owe theirs to ſome metalline tinge, and, as is always the caſe on thoſe occaſions, are more pellucid than the reſt.

It is common on the Yorkſhire, and Suſſex ſhores, as alſo in many of our gravel-pits; my ſpecimen, which is a very elegant one, and expreſſes all the varieties the body is ſubject to, is from a gravel-pit in St. James's-Park.

The native white veins of this maſs, which are not found in all the ſpecimens, at leaſt not of any ſize, or in any quantity, are plainly of a matter leſs debas'd with earth than the reſt, and have ſhrunk leſs in the general coaleſcence of the whole; and therefore are frequently found ſtanding in ridges above the reſt of its ſurface. Theſe ridges have been ſuppos'd of another origin in Stone, namely, from their having ſuffer'd leſs than the reſt of the maſs in the waters of the flood; but I have elſewhere ſhewn the abſurdity and error of that opinion.

SECT. V. Yellowiſh JASPER.

15. *Jaſpis duriſſima, ſubflava, variegata, quæ Jaſpis terebinthizuſa Antiquorum.*

Yellowiſh, hard, variegated Jaſper. The turpentine-colour'd Jaſper of the Antients.

This is the Jaſpis Terebinthizuſa, Plin. V. 2. p. 782. Boet. 251. Cæſalpin. 124. It is a Stone yet well known and valu'd in many parts of the world, and is generally found the moſt variegated of all the Jaſpers, tho' its colours being leſs ſtriking to the eye than thoſe of ſome others, it is not thought ſo beautiful.

It is of an extreamly cloſe, hard and compact texture, of a very rough, irregular and uneven ſurface; all the rough ſpecimens of it that I have ſeen, have indeed been ſo very rugged, that I never ſaw our own flints ſo irregular. It is generally of from three to ſeven inches diameter, and of no determinate ſhape; its general colour, if any one of its colours can properly be call'd ſo, which in many ſpecimens ſeems very dubious, is a pale and duſky yellow, not unlike the colour of common honey, or of the coarſer ſort of turpentine: This, however, makes up but a ſmall part of the maſs, the reſt being compos'd of whitiſh, browniſh, lead colour, a very pale red, and a cloudy cryſtalline matter, very much approaching to the nature of the Chalcedony; theſe various colours are not lodg'd in veins, nor yet diffus'd equally thro' the maſs, but are ever blended among one another in form of clouds, ſometimes the one, and ſometimes the other of them is wanting; nay, I have ſeen one end of a larger ſpecimen, in which the very characteriſtick of the ſpecies; the yellow has been wanting, and probably there may be compleat maſſes ſometimes found ſo, tho' I have not ſeen any ſuch; the matter of theſe different variegations is not only different in colour alſo, but in its very ſtructure; the pale red is the moſt tranſparent of all the colours; the yellow the moſt opake, and the reſt of different degrees between them; it has but an unpromiſing appearance on the outſide, but when broken ſhews a ſmooth and gloſſy ſurface, and is of conſiderable brightneſs and beauty; it is very heavy, and of extream hardneſs, it takes in the whole a very fair poliſh, but ſome parts of it being much harder than the reſt, a nice eye will diſtinguiſh a difference in the different height of their luſtre.

It very freely ſtrikes fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a mottled maſs of grey, red and brown.

Examin'd by the Microſcope, its various parts appear of different degrees of purity, but all of the ſame general texture, plainly a cryſtalline matter, debas'd by a parcel of a ſubtle earth, blended in different quantities with it at its original coaleſcence; and the whole of this motley maſs ſeems compos'd of a great number of ſeperate, impure, cryſtalline concretions which have fallen together in the general ſubſidence of the heavy matter of the globe, and meeting when neither quite ſoft nor quite concreted, partly by their different weight, and partly by the motion of the water above, have been blended in this irregular manner.

It is very common in the Eaſt-Indies, tho' but little regarded; its unpromiſing ſurface making no impreſſions on any body; we have it alſo in Germany, Bohemia, and ſome other parts of Europe, but inferior to the oriental; I never ſaw any of it from America; it makes very beautiful handles for knives, which is the only uſe I have ſeen it put to.

It was well known, tho' not much eſteem'd among the antients: Dioſcorides and all the old authors knew it by the name of Ἴασπις Τερεβινθίζων; and Pliny ſeems to have been very well acquainted with it, for he judiciouſly finds fault with the name, and ſeems to have wiſh'd it to be called by one that would have expreſs'd its remarkable variegations: *Teribinthezuſa,* ſays he, *impropio (ut arbitrior) cognomine veluti multis ejuſdem generis compoſita Gemmis*; what can be more reaſonable than this author's objection, or what better deſcription could he have given of the Stone in ſo few words than thus ſaying, it was as if compos'd of many Jaſpers united, or of many Gems of the ſame Claſs.

Sect. VI. Blueiſh JASPER.

16. *Jaſpis ſubcærulea, nigris nubeculis variegata; quæ Jaſpis Capnias, & Capnitis Antiquorum.*

Pale blueiſh Jaſper, with black veins and clouds; called the ſmoaky Jaſper of the Antients.

This is the Ἴασπις καπνίας. Dioſcorid. Capnitis, and Jaſpis veluti fumo infecta quæ Capnias Vocatur Plin. V. 2. p. 780. Jaſpis Capnitis Boet. 251. Ceſalpin. 124.

It was a Stone well known among the Antients, and leſs regarded by them than any other of the kind, as it is alſo by us; I think it is the only Jaſper I have ſeen come over rough, and never yet ſaw cut or wrought into any uſe; it is, however, a very ſingular ſpecies, and in the eye of a naturaliſt not leſs valuable than many of the more gaudy kinds.

It is of a cloſe, compact and firm texture as any of the preceding, generally of a ſmooth, even and gloſſy ſurface, in ſize, as far as I have ſeen, from four to ſix inches diameter, and ever of a flat and ſomewhat roundiſh ſhape; the reader will I hope not be diſpleaſed that I have thro' this Genus every where given ſome account of the general ſhape and ſize of the ſpecies; I know they are very uncertain and variable, but in ſubjects where characters are ſo much wanting, and in the hiſtories of which there has hitherto been ſo much obſcurity, I was willing to omit nothing that could give any idea of the thing deſcribed; and let me add, that whoever will ſearch the cabinets of the Virtuoſi and ſhops of artiſts thoroughly, will find them more regular in theſe things than he would otherwiſe imagine.

The colour of this ſpecies is ever a duſky blueiſh, or lead colour, and it never that I have yet ſeen is ſubject to any other variegations than black clouds, lines, and irregular ſtreaks, looking not unlike the wreaths of ſmoak aſcending in wav'd and curl'd forms from chimneys; this it was that gave the antients the idea of the ſmoaky look of this Jaſper; Pliny not only ſays it is *veluti fumo infecta*, but in another place, p. 788. ſays, it is *plurimis Spiris fumida*; which is indeed a very good deſcription of it, for its black variegations often run in a ſort of ſpiral lines, waving and twiſting from one end to the other of the Stone; but this I have obſerv'd is always in a perpendicular direction to the original ſite of the maſs, which may be eaſily determined, as the flat ſhape of all the maſſes plainly ſhews, if not which ſide has been upward, which downward, yet at leaſt what has been its perpendicular, what its horizontal direction; it looks conſiderably gloſſy on the ſurface, and when broken, makes a very agreeable figure; its variegations being very elegant, but plainly of a coarſer matter than the reſt of the maſs.

It readily ſtrikes fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a mixt grey.

Examin'd by the Microſcope, it appears a very irregular maſs; its baſis or blueiſh part of great brightneſs, purity and hardneſs, and moderately tranſparent; but its variegations every where ſofter, coarſer and more opake; theſe are very plainly of an entirely different matter, and if attentively view'd will be found to run in a continued chain from what has been the upper ſurface probably, quite thro' the body of the Stone; this is the caſe with the ſpiral or wav'd veins; the ſpots or blotches are on the contrary diſtinct, and placed irregularly and uncertainly in different parts of the Stone, but of the ſame coarſe texture with the veins; it is plain that the maſs of this Jaſper firſt ſubſided from the univerſal fluid, and that while it was yet ſoft this more coarſe and opake matter fell on it, either in ſmall concretions, and theſe ſinking in became the ſpots, or elſe in larger maſſes, which making their way by degrees, and in different directions thro' the body of the yet ſoft Stone, form'd theſe wav'd, ſpiral and ſmoak-like meanders.

It is ſometimes brought over from the Eaſt-Indies among others of more value; they have of it in Bohemia alſo, but greatly inferior, as all their Stones are, to thoſe either of the Eaſt or Weſt-Indies.

Theſe were the Jaſpers known among the antients, and of which we find an account in Pliny; but it is to be obſerved, that this author has not accurately diſtinguiſhed them, but many times named a Stone from a different place, or from ſome ſlight variation in colour as if a different ſpecies, tho' without juſt grounds; beſides theſe, however, we have two or three ſpecies peculiar to the European nations, and which were unknown to the old authors; theſe tho' of a coarſer texture, yet are true Jaſpers, and muſt not be deny'd a place after the reſt.

17. *Jaſpis marmorea, ſubcærulea, albo variegata.*
Blueiſh, marbly Jaſper, variegated with white.

This is a Foſſil very common among us, and like moſt other of our common Stones more miſtaken as to its origin than many that are more ſcarce; it is a Stone of but little beauty or value; it is a rude and coarſe maſs, of a rough and irregular, but very compact and compact texture, of a very ſmooth, equal and polite ſurface, generally of from two to five inches diameter, and of a perfectly irregular ſhape, ſometimes round, ſometimes flat, but more often of an irregular figure, as if it had been worn ſmooth by the motion of water, tho' commonly found in places where there is none, nor the leaſt probability of there having been any of many ages; its colours are only to a pale diſagreeable blueiſh grey, and a tolerably pure and clear white, the former making the baſis, the other being always diſpos'd in narrower or broader veins, or in irregular clouds; theſe veins are very bright, clear, and moderately tranſparent, and the grey part perfectly opake, but not without ſome brightneſs when freſh broken; it is conſiderably heavy, of great hardneſs, and capable of a very perfect and elegant poliſh.

It very readily ſtrikes fire with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It burns to a pale grey.

Examin'd by the Microſcope, it appears a very firm and compact maſs, the veins are of a cloſe, even and regular texture, very bright and pellucid, and evidently of the ſame ſubſtance with the white variegations of all the other Jaſpers, a cryſtalline matter debas'd with an admixture of a fine white earth; there are in ſome ſpecimens of this, and more frequently in the ſpecies before deſcribed, ſmall parts of the white ſubſtance, more bright and pellucid than the reſt, which are the ſame Cryſtal, leſs or not at all mixed with earth, and by that means left to concrete in their own form and purity; theſe examined nicely appear true hexangular Cryſtals: I have picked out of them ſometimes ſprigs of a line, or a line and half long: the grey part is perfectly opake, and tho' very deeply ſaturated with earthy matter, retains a great hardneſs, and anſwers very freely to all the teſts of Cryſtal.

It is very common in all our gravel pits about London, and in every other part of the kingdom, and has been hitherto univerſally taken not for a natural nodule, but for a fragment of blue and white Marble beat off from ſome ſtratum, and rounded by the water departing from off the earth at the end of the deluge; how far its ſhape and ſurface may have been influenced by the laſt mentioned agent, I cannot pretend to determine; it ſeems, indeed, very probable, that where vaſt multitudes of Stones were roll'd together by it, ſomething like the rounding and ſmoothing thoſe which lie on the ſea ſhores, muſt naturally in proportion to the time, have been the conſequence; but in regard to the firſt and general conjecture, it may without all diſpute be declared erroneous; we have ſeen in the courſe of theſe examinations, what Marbles, and what Jaſpers are, and of what matter each of thoſe Claſſes of Stones is compos'd; and when we ſee this anſwering all the teſts of Cryſtal, and found in looſe nodules only, for the world has never been yet known to produce a ſtratum of it, we need not heſitate to pronounce it a coarſe Jaſper.

SECT. VII. Black JASPER.

18. *Jaſpis marmoreus, nigricans, albo variegatus.* *Black, marbly Jaſper, variegated with white.*

This is like the former a common Stone among us; and commonly miſtaken for a fragment of black and white Marble; it is of a ſomewhat rough and coarſe tho' very compact and firm texture, of a very ſmooth, even and polite ſurface, tho' frequently not without cracks, eſpecially in thoſe ſpecimens which approach to a round figure, but theſe are always ſuperficial; it is of uncertain ſize, but moſt commonly from one to three inches diameter, and of a rude irregular ſhape, tho' often tending to roundneſs; its baſis or ground colour is a fine deep black, and its variegations a fair but opake white, and theſe are ſeldom diſpoſed otherwiſe than in veins, which all ſeem naturally to have been placed in an horizontal direction, tho' by the rolling about of the Stone while ſoft, in its acquiring a roundneſs, many of them are made to ſtand in different angles to one another; it is ever ſmooth and polite on its ſurface, but breaks ſomewhat ruggedly and unevenly, and has but little brightneſs either in its ground or variegations; it is conſiderably heavy, of very great hardneſs, and capable of a very beautiful poliſh.

It very freely ſtrikes fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a greyiſh white.

Examin'd by the Microſcope, it appears in its black parts a very compact, hard, and perfectly opake Stone, made up of cryſtalline matter deeply ſated with earth; the veins and variegations are of a Cryſtal, clouded with a white earth, and render'd conſiderably opake by it, but ſtill retaining much of the true cryſtalline gloſs and ſplendor.

It is very common in all our gravel pits about London and elſewhere.

19. *Jaſpis marmoreus, nigricans, flavo variegatus.* *Black, marbly Jaſper, variegated with yellow.*

This is a very elegant and beautiful Stone, but like the others is generally accounted a fragment of Marble, tho' no body ever ſaw a Marble at all like it in the world; and tho' like the others, it anſwers to all the characters of the Jaſpers, and to no one of the Marble. It is of a ſomewhat rude and coarſe, but very compact texture, of an unequal ſurface, tho' not without ſomething of a general ſmoothneſs on it, in ſize from one to ſix or ſeven inches in diameter, and in ſhape generally more or leſs approaching to roundneſs, tho' conſtantly with one flat ſide, which is what was its original bottom; its colours are a fine deep black, and a pale whitiſh, or ſomewhat browniſh yellow. It is not eaſy to ſay which of theſe is the baſis, which the variegation, for it is ever plainly compos'd of a multitude of thin plates of both, laid cloſely on one another, and in an undulated, but nearly horizontal direction; the inequalities of its ſurface are owing only to the more or leſs regular fitting of theſe ſeveral plates to one another, ſome being ever a little larger, ſome a little ſmaller than the reſt, but each of theſe has its edge very ſmooth and polite in itſelf; and hence is the general ſmoothneſs, notwithſtanding the frequent inequality of the different plates that compoſe the Stone; in breaking it ſhews a ſomewhat rugged ſurface, and has little or no brightneſs either in its black or yellow parts. It is conſiderably heavy, of great hardneſs, and capable of a poliſh not inferior to that of the oriental Jaſpers.

It readily ſtrikes fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a reddiſh grey.

Examin'd by the Microſcope, it appears in both parts a cryſtalline matter, conſiderably ſated with earth, and in both very opake; the yellow veins are ſomewhat more pellucid than the black, and they ſeem ſo firmly united at their commiſſures, that the ſubſidences by which they were form'd, have evidently happen'd very quickly one upon another, and while both were ſoft.

It is common on the ſhores of Yorkſhire, and has not that I know of been met with in any other part of the kingdom. It does not, however, owe its general external ſmoothneſs to the motion of the waves, for the ſpecimens I keep, which is perfectly ſmooth as any I ſaw of it, was from a clay pit at ſome diſtance from Scarborough.

20. *Jaſpis duriſſimus, carneus, hebes.*
Hard, dull, fleſh-colour'd Jaſper.

This is a Stone of but little beauty, but of prodigious hardneſs; it is of a moderately fine, and very compact, cloſe texture, of a perfectly ſmooth, even and polite ſurface, of very conſiderable ſize, being frequently found from eight to eighteen inches in diameter, and generally of a flatted, round or oval figure. It is of an extreamly pale whitiſh red or fleſh colour, generally pure and homogene throughout, but ſometimes variegated with horizontal veins, of a darker red; it is very ſmooth externally, but breaks with a ſomewhat rough and rugged ſurface, with very little brightneſs. It is very heavy, of a very ſingular hardneſs, and ſeems capable of a tolerably good poliſh, but has no beauty to tempt one to be at the pains of making the experiment.

It very readily ſtrikes fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a ſomewhat paler colour.

Examin'd by the Microſcope, it appears of a ſomewhat rude, irregular and rough texture, conſiderably pellucid, and of ſome brightneſs; its redder veins ſeem to owe that deeper tinge entirely to an ochreous earth, and are therefore naturally much more opake than the reſt of the Stone.

It is very common on the beach of Plymouth, and in many other places on the Britiſh ſhores; and is frequently brought hither to be us'd in the pavements of the ſtreets, for which purpoſe few Stones can ſerve more properly.

FOSSILS.

NATURALLY and eſſentially compound, not inflammable, nor ſoluble in water, found in detatch'd maſſes, and compos'd of cryſtalline matter, debas'd by Earth,

Series the third.

CLASS II.

THE SEMIPELLUCID GEMS.

Stones of a but ſlightly debas'd, cryſtalline matter, of great beauty and brightneſs, of a moderate degree of tranſparence, and uſually found in ſmall maſſes.

Of this claſs there are two orders, and under thoſe eight Genera.

Order the firſt.

Semipellucid Gems of but few variegations, and frequently of one plain ſimple colour, tho' ſometimes vein'd.

Order the ſecond.

Semipelluced Gems, remarkable for their veins, zones, and variegations.

SEMIPELLUCID GEMS.

Order the firſt.

Genus 1. SARDÆ. *Semipellucid Gems compoſed of cryſtal, with a ſmall admixture of Earth, of a plain uniform ſtructure, not tabulated, or cruſtated, and uſually of one ſimple colour.*

Genus 2. CHALCEDONII. *Semipellucid Gems of an even and regular, not tabulated, or cruſtated ſtructure; of a ſemi-opake cryſtalline baſis, and variegated with an admixture of coloured matter in form of miſts or clouds, but imperfectly blended in the maſs, and often to be diſcern'd in ſeparate moleculæ.*

Genus 3. HYDROPHANÆ. *Semipellucid Gems, compoſed of a cryſtalline matter, ſomewhat conſiderably debas'd by Earth, mixed imperfectly in the maſs, as in the chalcedonies, and naturally of an opake ſurface, but becoming lucid and tranſparent on being immers'd in water.*

Genus 4. PRAMNION. *A ſemipellucid Gem conſiderably debas'd by Earth, and appearing opake, unleſs held againſt a ſtrong light, perfectly equal in colour throughout the maſs, and free from clouds, ſpots, or veins.*

SEMIPELLUCID GEMS.

Order the ſecond.

Genus 1. ACHATÆ. *Semipellucid Gems, with veins and clouds, but without Zones, compos'd of cryſtal, debas'd by a ſmall quantity of Earth, not form'd by incruſtations round a nucleus, nor made up of plates, but ſeemingly the effect of one concretion, and variegated only by the diſpoſition which the fluid it was formed in, gave its differently colour'd matter.*

Genus 2. ONYCHES. *Semipellucid Gems with variouſly colour'd zones, but having no red ones, form'd of cryſtal, debas'd by but a very ſmall admixture of Earth, and compos'd either of a number of flat plates, or of a ſeries of coats made by incruſtation, round a central, nulceus. The different colour'd ones being covered with a coat of the common matter of the ſtone, and ſeparated from one another by, and alternately variegated with, veins of that matter in form of other zones.*

Genus 3. Sardonyches. *Semipellucid Gems of the onyx ſtructure, zon'd or tabulated, and compos'd of the matter of the onyx, variegated with that of the Carnelian.*

Genus 4. Cameæ. *Semipellucid Gems approaching to the onyx ſtructure, being compos'd of zones, and form'd on a cryſtalline baſis, but having their zones very broad and thick, and laid alternately on one another, with no other matter between: and uſually ſomewhat more debas'd with Earth than the onyxes.*

SERIES III.

CLASS II. Order I. Genus I.

SARDÆ THE CARNELIANS.

Semipellucid Gems compos'd of cryſtal, with a ſmall admixture of Earth; and generally of one ſingle and equal colour throughout; though ſometimes differing in the degree of it in different parts, and ſometimes vein'd.

1. *Sarda rubeſcens.*

The red Carnelian.

THIS is a ſtone extreamly common with us, and which was no leſs ſo among the antients, who uſed it for the ſame purpoſe of engraving ſeals. De Boet, has deſcribed it, Pag. 230. De Laet, Pag. 60. Cæſapin, 116. Aldrov. Muſ. Met. 923. We know it by no other name than the Carnelian, but many authors have made great confuſion, by treating of the Sarda and Carneola, its two names as two different ſtones.

It is a ſtone of a very fine compact and cloſe texture, of a ſomewhat uneven and rugged ſurface, generally of a roundiſh or pebble-like form, and commonly of from half an inch, to three inches in diameter. It is in the various pieces, of all the degrees of red, from a deep blood colour, to that of the red water in which raw fleſh has been waſhed; and this laſt, if any can be called ſo, is its proper colour.

It not only has theſe various colours in the different ſpecimens, but very frequently, in the different parts of the ſame maſs. Its more uſual appearance, however, is that of ſome one of theſe degrees of colour alone, and that equally diffus'd through it in all parts: It is generally without variagations alſo, but ſometimes has veins very beautifully diſpos'd in it, and thoſe generally rang'd in the manner of the veins of the Agats. Theſe are generally deeper, but ſometimes they are paler than the reſt of the ſtone, and it is not unfrequent to find dark, pale and whitiſh veins in the ſame maſs; they are generally laid in irregular concentric circles, and ſometimes in ſmall and very beautiful round ones. People acquainted only with the Carnelians as they are ſeen cut and wrought for ſeals, may imagine the Carnelian as plain and little variable a ſtone as any in the Foſſile World, for our Jewellers generally uſe the ſimple-colour'd; but among large parcels of them, there is found more variety than in almoſt any other ſtone I know. Veins, clouds, and ſpots of a pearl colour or blueiſh white are not uncommon in this ſpecies, and ſometimes there is ſo great a part of the ſtone of this colour, that the genuine matter of it, the red, appears in form only of clouds unequally ſpread in it, but no where quite wanting; and therefore, not allowing the calling theſe ſpecimens, the white kind vien'd with red, as many on a ſlight view might appear to be.

It breaks with a ſmooth even and flinty ſurface.

It is conſiderably hard and capable of an elegant poliſh.

It very freely and readily gives fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis, and burns to a ſomewhat paler red.

Examin'd by the Microſcope it appears a cryſtalline maſs of conſiderable tranſparence, and a fine gloſs; the different parts of the ſpecimens, are of different degrees of cloudineſs; the deepeſt colour'd generally, though not always the moſt ſo. The unaſſiſted ſight, indeed, gives a hint which the Microſcope greatly confirms in regard to the colouring this ſtone, which is that, as in all the varigated ſpecimens, there are ſpots, or parts more or leſs approaching to white; they are not however of the ſame matter with the white Carnelian hereafter to be deſcrib'd, but generally of a bluiſh miſty white, like that of the ground of many of the Agates and Onyxes; the ground of all this claſs of ſemipellucid ſtones is indeed the ſame, a cryſtalline matter debas'd with a peculiar ſubtile Earth, which gives it this caſt, and the Carnelian is no other than the ſame ſtone that wou'd have been an Agate, but alter'd by an admixture of a farther quantity of a fine red Earth, to which it owes its colour. Certain it is, that there are Carnelians, ſome ſuch indeed I have myſelf, of the very veins and clouds of the Agates, and which plainly only differ from them in an admixture of another Earth, which turns the whole red, and makes it ſomewhat coarſer and more opake.

Theſe are produced in the *Eaſt* and *Weſt-Indies*, and in many parts of *Europe*. Our Jewellers value none but the oriental, but there are in reality many very beautiful ones found in *Sileſia*, *Bohemia*, and in many places on the ſhores of the *Rhine*.

We uſe them greatly for engraving ſeals on, and they are very valuable for that purpoſe, being not too hard in the cutting, yet hard enough to bear accidents and take a very good poliſh, and being always found to part eaſily from the wax.

The difference of colour, in the different ſpecimens of this ſtone, has even led the world into the dividing it into different ſpecies. The antients all agreed in calling the deeper colour'd pieces, the male Carnelian, and the paler, the female. Τȣ̃ γὰρ Σαρδίȣ τὸ μεν διαφανὲς ἐρυθρότερον δε καλεῖται θῆλυ τὸ διαφανὲς μὲν μελάντερον δὲ ϗ ἄρσεν, are the words of *Theophraſtus*: and from him all the after writers for many ages kept up the diſtinction.

Our Jewellers, though they have now let alone the diſtinction of ſexes in this ſtone, yet diſtinguiſh one kind, as they call it, by the name of the Beryll: this is of a fine deep red, and of the beſt tranſparency this ſtone is capable of. This was at firſt called by them, the Beryll Carnelian, from the uſage of the *Italians*, who make Beryll a name common to all the ſofter Gems when ting'd with any colour and of a good poliſh. *De Laet* obſerves that in his time, the *Italians* call the coloured cryſtals by this name, whether tinged with red, blue, yellow, or whatever colour: It is an impropriety in the *Italians* to attribute the name of a diſtinct Gem, to a multitude of other different ſtones; but our Lapidaries have improved upon them ſo far as to leave all memory of meaning or diſtinction behind them, by abſolutely droping the true name of the ſtone, and keeping, inſtead of it, that given as an adjective or epithet to it only, and calling it now ſimply the Beryll; whereas the *Italian*, tho' he call'd this the Beryll Carnelian, and our yellow or purple Cryſtal, Beryll Cryſtal; yet if he either uſed or met with the word Beryll alone, ever meant and underſtood it as the name of the particular Gem, which the antients knew by it, and we by the name of the Aqua Marine.

It may not be improper indeed, that the Lapidaries have ſome term of art to diſtinguiſh the more valuable of theſe ſtones, from thoſe which are leſs ſo: but the naturaliſt is not to eſtabliſh diſtinctions on ſo uncertain a baſis as this is founded on, ſince the deeper and paler Carnelian are often but the different parts of the ſame maſs: And as a certain Jeweller once told Sir *Hans Sloane*, that one end of his fineſt emerald was oriental and of great value, but the other end was occidental, and not worth a farthing, ſo I have ſeen the true Beryll Carnelian, and the occidental, as theſe gentlemen wou'd call them, both in the different parts of the ſame nodule: Much the ſame thing happen'd to Mounſieur *De Reaumur*, on his carrying a parcel of his *French* turquoiſes to one of the Lapidaries of that nation, as to Sir *Hans Sloane* with his emerald; the workman told him, that ſuch and ſuch of them were of the old rock, the place from whence the fineſt turquoiſes of *Perſia* are brought, and ſuch others of the new, and could not be perſwaded to alter his expreſſion, though that gentleman aſſur'd him they were all from the ſame place, and that in their own country. The truth is, that though the words of the old rock, and of the new rock, and oriental and occidental, have in themſelves a meaning, and we are apt to underſtand them according to it, yet with the workmen and dealers in ſtones, they are become mere terms of art, and mean nothing but fine or coarſe, hard or ſoft, *&c.*

2. *Sarda flaveſcens.*
The yellow Carnelian.

This is a ſtone in the opinion of many, more beautiful than the former, and when fine, generally valued at a greater price.

It is of a fine compact and elegant texture, of a tolerably ſmooth, even and regular ſurface, and very uncertain in ſhape, being ſometimes found broad and flat, though more frequently roundiſh and in the ſhape of the ordinary pebbles. It is in ſize generally of from one to three inches in diameter. It is of a very beautiful yellow, ſometimes purely and perfectly ſo, and of all the degrees from the lemon colour to the deepeſt plain yellow, but more frequently it is of a kind of flame colour, a yellow with a ſlight admixture of red in it. It is like the former ſpecies, frequently of the ſame even and uniform diſtribution of colour throughout, and frequently alſo has it in different degrees in the different parts, and often is clouded with a deeper yellow, or vein'd with a deeper or a paler and ſometimes with a whitiſh in orbicular or irregular, but concentric rows of lines running about one, two or more points. Its variegations in all reſpects are like thoſe of the red kind; and like it, there is frequently in this, ſo much of a whitiſh matter, that were it perfectly free from the yellow, and properly diſpos'd, it might very well paſs for the baſis or common matter of the ſtone. It is of a ſomewhat greater degree of tranſparency than the red; it breaks with a ſmooth even and gloſſy ſurface, and is very hard and capable of a fine poliſh. It is uſually ſo much of the yellow amber colour, that when poliſhed, it is not at firſt ſight eaſily diſtinguiſhed from it.

It very freely and readily gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It burns to a pale fleſh colour.

Examin'd by the Microſcope, it appears of the ſame ſtructure with the red kind, but more tranſparent; one thing there is obſervable in theſe, as in many other of the ſemipellucid Gems, which is, that the deepeſt colour'd parts are often the moſt tranſparent; this is remarkably the caſe in theſe, for the deepeſt yellow ſpecimens I have met with of this ſpecies, have ever been the moſt tranſparent as the deepeſt red called the Beryll Carnelians are alſo well known to be of thoſe. It is plain therefore that the depth of colour does not depend on the quantity, but on the nature of the earthy or other matter that gives it, ſince a large quantity of a pale red, or pale yellow, ochreous Earth wou'd, as we ſee it there to be the caſe, render the ſtone they enter'd the compoſition of more cloudy and opake, but wou'd never give it the deep dye of thoſe that a much ſmaller admixture of a deeper colour'd earth has made ſo dark colour'd.

We have this principally from the *Eaſt-Indies*; there are ſome ſpecimens of it found in *Germany*, but they are neither good nor frequent: in *England* I have ſeen large maſſes of it, but the colour is never well ſpread through them. There is an account from the *Eaſt-Indies*, that the red Carnelians we receive from thence, owe their colour to heat and other artificial means, and that they were originally white or yellow, but the naturaliſt will eaſily determine this to be erroneous; and that thoſe who propagate the accounts of it, either deceive themſelves or other people. We have red Carnelians, ſuch as they are, common enough in *England*, and as we well know the *Eaſt-Indies* afford ſtones of all kinds highly ting'd with this colour, why ſhould we imagine that nature, which had given it in ſuch plenty to their Agates, Jaſpers, and Sardonyxes, ſhould deny it to their Carnelians alone.

3. *Sarda albeſcens.*
The white Carnelian.

From this and the former ſpecies of the Sarda, it muſt appear how very improper our Engliſh name of Carnelian expreſſes this ſtone. It is however in itſelf a true Genus of Foſſils, and has its proper characters according to which it may be made to comprehend any other ſtones that may hereafter be diſcovered of the ſame texture, and may ever be diſtinguiſhed from all others. The original name Sarda is equally applicable to any of theſe, but the modern Latin and Engliſh name Carnelian, taken from the colour, properly can belong only to the firſt ſpecies, which well reſembles raw fleſh of various colours, as it has more or leſs of the blood in it, and the uſe of it reduces us to an impropriety of ſpeech, in applying it to a yellow and a white ſtone.

This is of a moderately fine and compact texture, of a rugged and unequal ſurface, and in moſt ſpecimens, of a very uncertain figure, being often roundiſh and like the ordinary pebbles, often flat, and not unfrequently of a rugged ſhape like that of our common flints; it is the largeſt of all the Carnelians, being found from two to ſix or ſeven inches in diameter, and ſometimes much more. It is of a very elegant colour, not a pure clear white, but rather what we call a pearl colour, a white, with an agreeable admixture of blue. It is like the other ſpecies often equally colour'd throughout the maſs, and frequently alſo clouded, ſpotted and vein'd, with a more or leſs blueiſh white, though never, ſo far as I have yet obſerv'd, with any other colour. It is leſs tranſparent than either the yellow or the red kind. It breaks with a very ſmooth and even ſurface, and is of a conſiderable hardneſs and capable of a fine poliſh. The veins when diſpoſed regularly, as they uſually are, and of the two colours both blewer and whiter than the body of the ſtone, make a very elegant appearance in it when it is poliſhed; and many pieces of it that I have ſeen, have been far from inferior to the fineſt red Carnelians.

It very freely gives fire with ſteel.

It does not in the leaſt ferment with Aqua Fortis.

It burns to a very pure ſnow white.

Examin'd by the Microſcope, it appears leſs bright, as well as leſs tranſparent than either of the other kinds: it is variouſly pellucid in the different parts, and generally moſt ſo in the blueſt, and moſt opake in the whiteſt. It is eaſy to infer from this, that the blueiſh veins are a cryſtal, debas'd only by the ſame ſubtile Earth common to the whole Agate and Onyx Claſs, and that the white have a farther admixture of Earth of that colour, as the red and yellow ſpecies have of theirs.

It is found in the Eaſt-Indies and in many parts of Europe. France has afforded many good pieces of it, and Germany is famous for having it very plentifully and of a very good colour; the beſt, however, next to the Oriental, are thoſe of New Spain, which are ſometimes ſo large that ſmall vaſes are work'd in them.

Theſe are the Carnelians, or to uſe a more proper name, the ſpecies of the Sarda known to us at preſent. The earlieſt ages, and authors of greateſt antiquity, ſeem however to have been acquainted with fewer than theſe; properly indeed, only with one ſpecies, the ordinary red one; for all their diſtinctions are only according to the different degrees of red in the ſtone. This, however, was not the caſe in Pliny's time. That author mentions ſeveral kinds, and particularly three of the Indian Sarda; how far really different all theſe might be from one another, or how many really diſtinct ſpecies they might comprehend, the imperfect deſcriptions that author has left us, make it impoſſible to determine. The degree of brightneſs and tranſparence ſeems to have been the ſtandard of many of his diſtinctions, and thoſe we know muſt come to nothing; but it is evident he was acquainted with the yellow, and probably alſo with the white; theſe, however, were of no repute or value in thoſe days, ſince he tells us that thoſe of the colour of honey, by which he plainly means the yellow, were accounted bad and of no value, and the teſtaceous or ſhell-like, even of leſs than thoſe. I preſume it will not be doubted that he meant our yellow Carnelian by his honey-coloured ones, though probably the fine ones of this ſpecies were not frequently met with at that time; and what he can mean by teſtaceæ or ſhell-like, I cannot conceive, unleſs ſome that were like ſea-ſhells in colour, the white of which, the white Carnelian indeed ſo well reſembles, that I don't know any word by which it could ſo properly be expreſſed, it being bright, yet very opake, like the inner part of a ſhell, and, like it, of a pearly or bluiſh white.

Pliny informs us, that no ſtone was in more frequent uſe among the antients than this for ſeals, for which we find at his time it was eſteemed, as it ſtill is, extreamly uſeful. He gives us three or four different places for its production, but acknowledges it to have been firſt found in that from which it has its name: It is evident indeed to whoever will read the antients on theſe ſubjects, that the country where a ſtone was firſt known to be produced, frequently gave it its name; the Magneſia, Lydius, and Heraclius, are memorable inſtances of this, and indeed of the ill effects of the cuſtom, ſince one ſtone of a country having as much right to called by its name as another, it became common for different ages, to call different ones ſo, and hence the errors of thoſe who wrote long after them. Pliny's ſaying of the Carnelian, that it was *primum ſardibus reperta*, at leaſt our reading it ſo in many of the copies of that author, have from the near reſemblance of the word, made many imagine that it was not antiently found in the iſland of Sardinia, but in the neighbourhood of Sardis, a city in Lydia. But this is evidently erroneous, ſince the adjective Sardus, well known in Latin Authors, ever ſignifies of Sardinia, not of the city Sardes. The name of it is Σαρδιον alſo in the Greek, and that is known to be a word uſed every where elſe to expreſs of Sardinia. The old Marbodeus has it alſo plainly, that it had its name from its being firſt found by the people of Sardinia.

Sardus a Sardis eſt, a quibus ante repertus.

And Iſidore has it exactly in the ſame manner,

Sardius dicta eo, quod primum reperta ſit a Sardis.

It is plain that theſe paſſages could have no reference to the city Sardis, and very probably as they both took moſt things from Pliny, they read it, in more correct copies of that author, in the ſame words. The excellent critic Salmaſius, is alſo abſolutely of this opinion; he quotes both theſe authors, and concludes that the genuine reading of Pliny, is, ipſa Gemma vulgaris et primum Sardis reperta. The error of thoſe who follow Epiphanius in the opinion of this ſtone's having its name from the fiſh Sarda, is however much more eaſily refuted, ſince that is a mere Latin name; the Greek word for the ſame fiſh being Pelamys, as Pliny is a witneſs; and it is well known that Σαρδιον in Greek is the conſtant name of this ſtone, as well as Sarda in Latin. It were well however, if this name were ſtuck to alone, ſince uncertain as it is in its ſignification, that of Carneolus, or as it is ſometimes written Corneolus, has been the occaſion of much error, from its being miſtaken for a name given to a different ſtone, and not a ſynonymon of this. Rueus Albertus and others, have treated diſtinctly of the Carneolus and Sarda as diſtinct ſtones; and the good old Marleodæus, after he has treated at large of the Carneolus, gives another chapter on the Sarda, though from his deſcription, the Carneolus was very evidently the ſame ſtone. He ſays of it,

Sed neque Carneolos lapides memorare pigebit,
Qui licet obſcuram videatur habere ruborem.

And afterwards,

Quique lavaturæ Carnes par eſſe videtur.

And of the Sarda afterwards,

Rubri ſolet eſſe coloris, &c.

SERIES III.

CLASS II. ORDER I. GENUS II.

CHALCEDONII.

Semipellucid Gems, of an even and regular not tabulated texture, of a ſemi-opake cryſtalline baſis, and variegated with different colours, but thoſe ever diſperſed in form of miſts or clouds, and if nicely examined, found to be owing to an *admixture of various coloured earths, but imperfectly blended in the maſs, and often viſible in diſtinct moleculæ.*

BEFORE we enter on the Enumeration or deſcriptions of the different ſpecies of this Stone, it may not be improper to enquire ſomewhat at large into its general hiſtory; ſince the different writers, on theſe ſubjects, have been very much divided in their opinions abeut it. There have been beſide the too general inadvertency of the editions of the antient Lithologiſts, and the careleſs quotations from them in the after writers, two other great occaſions of error in regard to this Stone: the one, that the Onychites, ſo often mentioned by the Antients, as uſed for making the boxes for for preſerving perfumes and coſtly ointments, being evidently not the ſame with the Onyx Gemm of the ſame authors; and it not occurring to theſe authors, that this Onychites was no other than the common Alabaſter, as has been already evidently proved; they were obliged to have recourſe to ſome other ſtone; and unfortunately fixing on the Chalcedony, have determined that to be this Stone: And the other, that the words Chalcedonius and Carchedonius, the χαλχήδονιον and χαρχήδονιον of the Greeks, being words of a very ſimilar ſound and orthography, were frequently miſtaken for and confounded with one another, and that by writers of credit. Even *Epiphanius*, ſpeaking of the Carbuncle; has evidently run into the error, and called it χαλχηδονιος inſtead of χαρχηδονιος; and the common editions of *Pliny* have all of them Charchedonii Smaragdi inſtead of Chalcedonii. *Nicolaus Guibertus*, who has treated particularly of the Onychites has fallen into the firſt of theſe errors, and makes that ſtone a different ſpecies from the Alabaſter; and from him it is now among the Italian, and moſt other Authors, agreed, that the Onychites of the antients is the Chalcedony of the moderns, and moſt would determine what they have deſcribed under that name to be a baſer ſtone of the Onyx kind, and when moſt perfect much approaching to that Gemm. None of the accounts of the Antients, however, will be found to warrant this conjecture, they all deſcribing that ſtone as a ſoft marble, and the Chalcedony as a Gemm.

The confuſion of the words Chalcedonius and Charcedonius, among the beſt Authors, and their great affinity in ſound, have led almoſt all the late writers into the error of confounding this ſtone with the Charcedonius, or χαρχήδονιος λίθος, the fine Carbuncle of the Antients hereafter to be deſcribed, and *de Boet* begins his Hiſtory of the Chalcedony with a deſcription of that Gemm. He abſolutely confounds the whole hiſtory at his firſt ſetting out, miſtaking the two words for ſynonimous terms, and beginning his chapter with *de Chalcedonio vel Carchedonio*, immediately tells us, *Plinius inter Rubini Genera recenſet.*

It cannot be wondered at, that perplexity, uncertainty, and error, have been the effect of theſe blunders, among people who ſhould have diſtinguiſhed better: But the plain effect of the whole has been, that the better judges, who have examined a little into things ſince, ſoon found, that the Onychites, the firſt ſtone gueſſed at, as the Chalcedony of antients, was no other than the common Alabaſter, and the other a Ruby or an Emerald; and as ſlight diſcoveries are generally the baſis of too haſty concluſions, the Gentlemen who had found the error of theſe conjectures, readily determined thence, that there was no ſuch ſtone as the Chalcedony at all; that it was only among the antients, an epithet, denoting the country of ſome ſpecies of different Genera; and that they knew no peculiar ſtone by that name. It is very certain, that the antients knew a Charcedonian Carbuncle and a Chalcedonian Emerald, neither of which can at all agree with the Chalcedony of the moderns; but we are to obſerve alſo, that they knew a Chalcedonian Jaſper, which Pliny deſcribes, V. 2. p. 782. as a thick turbid kind. Talking of the Jaſpers of different nations, he ſays, *Chalcedon mittit Turbidam.* And this Jaſper is evidently the Chalcedony of the moderns. The white parts of many of the Jaſpers ſo much reſemble this ſtone, that no one can wonder at this author's ranking it among the Jaſpers; nor is it at all to be doubted, but that Dioſcorides, and other of the antients, have alſo deſcribed its various ſpecies under the different kinds of the ſame ſtone. It is certain, that abſolute mention is made of the Chalcedony in the revelation of St. John, c. 21. v. 19. and Iſidore, Albertus, Bartholomeus Anglus, and all the writers on Foſſils mention it; ſome indeed confuſedly, but moſt as a diſtinct ſtone. The beſt interpreters of the Greek Teſtament have given us the Chalcedony, for the χαλχήδων of the Greek. Arethas, indeed, have given us, on this occaſion, a repetition of what Pliny ſays of the

Carchedonian Carbuncle: which, as de Laet has obſerved, was doubtleſs owing only to this finding no account of the Chalcedony, as a diſtinct ſpecies of ſtone among the antients; and this ſeems one great reaſon, with that Author, for determining, that the antients knew no other Chalcedony. But with this excellent Author's leave, I ſee no more in this, than that we have from this text a great proof, that a diſtinct ſtone was known by the name χαλχήδων; and that this Commentator run into the common error of confounding it with the Carchedonian Carbuncle. I cannot at all think that ſtone meant here, ſince the general teſtimony of the antients is, that they never uſed the word χαρχήδων alone for the Carbuncle, but gave it only as an epithet to diſtinguiſh the ſpecies, always expreſſing themſelves by either Ἄνθραξ χαρχήδονιος, or χαρχήδονιος λίθος, but never by χαρχηδων alone; ſo that to allow the comment of this Author, we muſt alter the text, and even force the word into a ſenſe it never ſtands in with the Antients.

If it be objected, that this ſtone being placed between the Sapphire and the Emerald, may be thence more probably meant for a Carbuncle than a Semiopake Stone; it is eaſily anſwered, that they were not placed together, either according to their nature or value in that place, for the Jaſper is the ſtone placed immediately before them, which is certainly as opake and of as different a nature from thoſe Gemms as the Chalcedony.

Upon the whole, it ſeems not to be doubted, but that the Chalcedony of the moderns was a ſtone well known to the antients, that it had its name from its country, and was by them very aptly called the Chalcedonian Jaſper.

1. *Chalcedonius Albido ſubcæruleus;*
The bluiſh white Chalcedony.

This is the moſt ordinary ſpecies of the Chalcedony, and what is uſually known among the more skilful of our Lapidaries under that name. It is the Jaſper Chalcedonius of *Pliny*, v. 2. p. 782. Ιασπις κρυϛαλλωδης, of Dioſcorides, the Chalcedonius Aldrov. Muſ. Met. 823. Candidus Onyx, ſive Chalcedonius Cæſalp. 121. Chalcedonius, ſive Carchedonius, Boet. 238. Chalcedonius de Laet. 76. Marbod. Gall. 23. Iſidor L. 16. Barth. Angl. L. 16. Albert. L. 2. C. 3.

It is a very pure and pellucid ſtone, and of an extreamly fine, cloſe, compact and firm texture, of a rude ruggid ſurface, in ſize from half an inch to four or five inches in diameter, though more ſpecimens are found of from two to three inches than of all the other ſizes together, and of a perfectly irregular ſhape, ſometimes rudely inclining to roundneſs, but more generally perfectly irregular, and often flattiſh. It is ever of one pure, ſimilar ſubſtance, and one equal and regular ſtructure, never being either tabulated in its compages, or veined in any manner; it is covered with no external cruſt, and is of a whitiſh colour, with a very faint caſt of blue, which is never laid in lines or ſpots, but ever diffuſed through its whole ſubſtance, in form of a miſt or thin cloud; this, however, is not equally diffuſed through all the parts of the maſs, the middle being generally moſt clouded, and the outer parts variouſly and uncertainly leſs, but no ſpeck of the largeſt maſſes is ever perfectly without the cloudineſs. It breaks with a pure and perfectly cryſtalline ſurface, is of great brightneſs, and very tranſparent; it is conſiderably heavy, and ſomewhat leſs hard than the oriental Onyx, but capable of a very elegant poliſh.

It very freely and readily ſtrikes fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a pure white.

Examined by the microſcope, it appears a pure, equal, and very compact maſs, more tranſparent in ſome parts than others, and evidently compoſed of cryſtal, but ſlightly debaſed by a whitiſh ſubtil earth, and very faintly tinged with particles of copper. The colour here indeed appears very different from the blue, generally imparted by that metal; but if we conſider the different degrees of colour in the Sapphires, ſome of which have even leſs blue than this, we ſhall not be in any doubt about this Stone's owing its ſlight tinge to the ſame particles.

The more skilful of our Lapidaries diſtinguiſh this clearly from the Agates, Nephriticus's, and other ſtones, and divide it, according to their way, into the Oriental and European kinds. The oriental in this, as in the others, is greatly the more eſteemed; and among that principally ſuch maſſes, or ſuch parts of maſſes, as are of the greateſt

eſt tranſparency, and have moſt of the bluiſh cloud in them. It is, at beſt, however, a ſtone of but little value, being reckoned inferior to the Onyx, Agat, and Jaſper.

The Oriental are found in all parts of the Eaſt-Indies, and are very frequently brought over as ballaſt in our Eaſt-India ſhips; they lie on the ſurface of the earth, and in great quantities on the banks of rivers. The Europæan are frequent in Germany, Bohemia and Italy; they are very little valued, and are generally very opake, of a dusky whitiſh colour, and with very little of the blue tinge.

Let it not appear ſtrange, that I have allotted no greater a degree of hardneſs to this Stone. I am very ſenſible, that others have generally allowed it a much greater; but the experience of Lapidaries, and of a wheel of my own, perfectly inform me, that it has no other than that I have allowed it. The reaſon of the error of others, is, that Pliny calls his Carchedonius, Scalpturæ Contumax, which they have all repeated from him, not conſidering that it was of a kind of Carbuncle, not of this ſtone, that he ſpoke it; and the deſire of making this agree with the later Authors accounts, has certainly been the origin of this imaginary quality in it.

The principal uſe of this ſtone, with us, at preſent, is in poliſhing into a kind of counters, with which people reckon at cards. In Italy they make handles of knives of it, and beads to count their prayers, and ſometimes work it into cups; but it is ſeldom found beautiful enough to anſwer the expence of that workmanſhip.

2. *Chalcedonius Hebes Venis lacteis.*
Dull milky-veined Chalcedony.

This is a ſtone ſeen not unfrequently among our Lapidaries, though not much valued by them, nor known by its proper name; thoſe whom I have heard attempt to name that, have generally called it a white nephritick ſtone. It is the Chalcedonius lacteis Zonis Diſtinctus. Boet. 240. de Laet. 78.

It is a moderately pure and pellucid ſtone, of a very fine, cloſe, and compact texture, generally of a ſmooth, even, and polite ſurface, and of various ſizes, from one inch to twelve in diameter; the very large ones are ſcarce, and uſually of a round or oval ſhape, but generally a little flatted. It is ever of one ſimilar ſubſtance, and of an equal regular ſtructure throughout the maſs, and never tabulated, or plated; of a very agreeable, miſty, yellowiſh white, or cream colour, very regularly diffuſed through the whole ſubſtance, except where it is veined, as it is in ſome few places, with irregular lines, often three or four nearly together, though ſometimes ſingle, of a pure white, looking like ſo many ſtreaks of milk among a quantity of cream. Its yellowiſhneſs is perfectly wanting in theſe veins; though every where elſe, through the ſtone, it is diffuſed like the grey in the former ſpecies, in form of a miſt, or thin cloud. It breaks with a very even cryſtalline ſurface, and is very bright and gloſſy, though but imperfectly tranſparent; the white veins ſeem as if they would prove more tranſparent than the reſt, but they are in reality the leaſt ſo of any part of the maſs; it is moderately heavy, ſomewhat leſs hard than the precedent, but capable of a very elegant poliſh.

It very freely gives fire with ſteel.

It makes not the leaſt effervesſcence with Aqua Fortis.

It burns to a dusky white.

Examined by the microſcope, it appears, a very regular and uniform maſs, pretty equally bright and tranſparent in all parts, except that the veins are ſomething leſs ſo than the reſt. The whole is very plainly ſeen to be a cryſtalline matter, debaſed by an earth, not well mixed in the yellowiſh parts, but more perfectly ſo, and in greater quantity in the white, or veins, though they might on a careleſs inſpection ſeem more pure and free from it.

Our Lapidaries make no diſtinction of this into the oriental and occidental: the beſt ſpecimens of it being but of little value.

It is found principally in New Spain, and is brought frequently to us in ſmall pieces, bored through the upper part, that they may be hung to the neck, according to the opinion of the Spaniards, to give plenty of milk to nurſes. We have of it alſo in Germany, France, and ſome other parts of Europe. In Germany it lies frequently on the ſhores of rivers, and in ſome parts of France is frequent in maſſes of four or five inches diameter, lying on the ſurface of the earth, but this is leſs beautiful than the American.

3. *Chalcedonius nebuloſus fuſco nigreſcens hebes, qui Jaſpis capnias & Capnitis antiquorum.*
Browniſh-black, dull, cloudy Chalcedony.
The ſmoaky Jaſper of the antients.

As the ordinary Chalcedony was, as has been before obſerved, ranked among the Jaſpers by the antients, it can be no wonder that this ſpecies, which is much more opake and dull, ſhould be ſo too: the name they gave it very happily expreſſes its character, it ever looking as if obſcured by a cloud of thick ſmoak. It is the Jaſpis Capnitis of Pliny, Dioſcorides, and the reſt of the ancients.

It is a leſs beautiful ſtone than any other of this Genus; of a very firm, equal and compact texture, of a rude, rugged and knobby ſurface, and very irregular and uncertain in ſize and ſhape, being found from two to eighteen inches in diameter, and ſometimes of a roundiſh, but generally of a perfectly rude and irregular form. It is of a ſimple and even ſtructure, never plated, or ſeeming other than the effect of one ſimple concretion. Its colour is a pale browniſh white, clouded almoſt all over in different degrees with a black, opake, earthy matter, ſpreading itſelf as in all the Chalcedonies, in form of a miſt, and ſeeming but imperfectly mixed with the cryſtalline matter; but in this it is very ſingular, for the adulterating Earth being both in larger quantity than in the reſt, and of a darker colour, it is, for both theſe reaſons, the more plainly diſtinguiſhable, and is thrown into a very ſingular form, in almoſt all the ſpecimens I have ſeen, ſpreading itſelf through the maſs, in form of a cloud or volume of thick ſmoak. It is very black, and renders the ſtone almoſt perfectly opake, where thickeſt; where leſs ſo, it is of a paler brown; and I don't know whether any part of the ſtone is ever perfectly without it. It has no veins or ſtriæ in any part of it. It breaks with a very ſmooth, bright and gloſſy ſurface, and is moderately tranſparent in the places where it is leaſt clouded. It is of very conſiderable hardneſs, and takes an elegant poliſh.

It very freely ſtrikes fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a greyiſh white.

Examined by the Microſcope, it very clearly ſhews both its own particular origin and ſtructure, and that of its whole Genus. It appears very plainly to be a cryſtalline pebble, debaſed by a large quantity of earth, which ſeems to have been introduced into its ſtructure at a time when it was but very little capable of receiving it, and to have diffuſed and ſpread itſelf but very unequally and irregularly thro' it. Where there is leaſt of this, the ſtone is moſt pellucid. Its opacity increaſes regularly with this cloud; and, where it is thickeſt, I have often obſerved plain moleculæ of Earth, perfectly opake, of a looſe texture, and wholly unaltered from their original ſtructure lodg'd in it. The diſcontinued ſtate of the matter that makes the thinner clouds, is evidently the ſame, and owes its appearance to its being compoſed, not as the earthy variegations of the other ſtones of even maſſes of earthy matter, but of millions of theſe ſeparate moleculæ, tho' too ſmall to be the objects of our ſenſes.

It ſeems no improbable conjecture, from this obſervation, that this and the other Chalcedonies owe their origin to a cryſtalline matter, which, if pure, would have formed a fair nodule of pebble cryſtal; but into which there has been introduced a quantity of whitiſh, yellowiſh, or blackiſh Earth, and that at a time when the cryſtal was too far hardened in its own ſtructure to ſuffer it to blend itſelf perfectly with it, or otherwiſe than as we ſee it in unequal miſts, made up of ſeparate moleculæs. The differences of the ſtones of this claſs are ſo ſlight in themſelves, and ſo much dependant on accidents at the time of their formation, that I make no doubt of many of them being owing, like this, to mere accidents at their original concretion, and that the ſame cryſtal, and the ſame earth, in one degree of admixture, may have made one, and, in another, another of them; and that the veined, the clouded, and the equally coloured ſtone, may have no other real difference than that of the various ſtates the ſame component particles were in, when they came together. This, however, does not at all affect our ſyſtems at this time; for ſince whatever was its origin, the ſtone that was once a Chalcedony, a Jaſper or an Agate, will continue to be ſo for ever: its origin makes no difficulty in our accounts of it.

This ſpecies is but little valued, and ſeldom cut into any thing better than the handles of knives, or counters. They have it in the Eaſt-Indies in great plenty; and it is found in Germany, Italy, and France.

4. *Chalcedonius luteo-rubens.*
The yellow and red Chalcedony.

This ſpecies is greatly ſuperior to all the reſt of this Genus in beauty. It is greatly eſteemed among the *Italian* Lapidaries, tho' but little known with us. *De Boet* has deſcrib'd it, but improperly, under the character of a ſtone variegated with blue, white, yellow and red, pag. 239. For the truth is, that it is indeed liable ſometimes to an admixture with the ordinary Chalcedony, in which caſe it has many pellucid and colourleſs parts, though theſe are not properly white, and much of the natural miſty gray of that ſtone; but it is not one ſpecimen in an hundred that is ſo mixed, all being truly and diſtinctly compoſed of an admixture of red and yellow, only with an opake cryſtalline baſis.

It is of an extreamly firm, cloſe, compact and regular texture, and of a ſmooth, even and polite ſurface. It ſeldom exceeds three inches in diameter, nor is it common to find it much ſmaller, and it is generally of a flattiſh, oblong form. It is not tabulated, but of a plain, even ſtructure, like the reſt of this Genus. Its natural colour ſeems an opake whitiſh brown; and its variegations are of a red and yellow Earth: They are ever diſpoſed in miſts or clouds, as is the invariable character of the Chalcedony, and are either abſolutely diſtinct and ſeparate, in which caſe the ſtone is moſt beautiful of all, or variouſly blended one with another; if perfectly, they form an elegant orange colour; if otherwiſe, they make very pleaſingly varied marks. It has ſeldom any regular veins; but, when it has, they are ever of the matter of the baſis, free from all other admixture, and are conſequently either whitiſh or browniſh. It breaks with a fine, ſmooth, gloſſy ſurface, and is very bright, and tolerably tranſparent, conſiderably hard, and capable of an elegant poliſh.

It freely gives fire with ſteel.

It makes no efferveſcence with Aqua Fortis.

It burns to a reddiſh white, or fleſh-colour.

Examined by the Microſcope, it appears a maſs of Cryſtalline matter, with Earth blended imperfectly among it, as is the caſe of the other Chalcedonies; but it ſeems here more perfectly mixed than in any of the others; tho' in ſome of the red parts an accurate obſerver, with good glaſſes, will often diſcover molecules of plain Earth.

It is found only in the Eaſt-Indies, and there not plentifully. I have been ſhewn a ſtone for it which was found in Bohemia, and was very beautiful, but this was truly no other than a German Agate. The Italians uſe it principally for Beads. The Germans call both this Variegated Agate; and another, which they have in much greater plenty, Caſſidonies, and make the ſame uſe of them. The Italians alſo ſometimes cut ſeals on them. Bellonius, l. 1. c. 64. mentions a much more extraordinary uſe of them among the Turks, which is the drawing them after oxen to get their corn out of the ears, inſtead of thraſhing, as with flails. I do not doubt the truth of their uſing this method, but certainly the ſtone they uſe on this occaſion cannot be of this kind. The Germans have a ſtone, which ſome among them call by this name alſo, from Lorrain, which is found in very large maſſes, and uſed for making large vaſes. It is variegated with yellow and red, but very foul and opake; and is no other than a common ordinary Jaſper. It is poſſible the Turks may have this ſtone; and Bellonius might be led by having heard this Lorrain Jaſper called by the name of a Chalcedony, into the error of calling that uſed by the Turks Chalcedonius Lapis; tho' it is hardly probable from what we ſee of this from Lorrain, that they have it there in plenty and bulk enough to ſerve for ſuch purpoſes.

It has been ſuppoſed by many alſo, that the Onyx Alba, the White Onyx of the antients, was the Chalcedony of the moderns; but without ſufficient reaſon, for the antients diſtinguiſhed better. Our Chalcedony is never plated or marked with regular zones: and they would never have called any ſtone an Onyx, which was not ſo: One of their earlieſt diſtinctions being that of the Onyx, from other Gems, by its zones. To this may be added alſo, as ſome confirmation, the judicious obſervation of *De Laet*, that the antients have none of them any where mentioned an Onyx from this country.

SERIES III.

CLASS II. ORDER I. GENUS III.

HYDROPHANÆ.

THIS is a neceſſary new Genus of Foſſils; ſince, tho' we at preſent know only two ſpecies of it, and thoſe ſtones whoſe nature and properties have hitherto been but very imperfectly enquired into, yet a cloſe obſervation ſhews them to be of a different ſtructure from any of the before-mentioned genera of ſtones. A generical character, which will diſtinguiſh them from other ſtones, and take in any further ſpecies, if any ſhould hereafter be diſcovered, may be. That they are ſemipellucid ſtones, compoſed of cryſtal and earth, the latter ingredient in large proportion, and mixed imperfectly, as in the Chalcedony, giving a general cloudineſs or miſtineſs to the ſtone as to that, but differing from it, in being more opake, and of ſo imperfect and irregular an admixture, as not to be capable of ſo good a poliſh, but appearing of a duſky and foul ſurface, till thrown into water, in which they become lucid, and in ſome degree tranſparent; either in part, or totally alſo changing their colour.

1. *Hudrophanes ſimplex albidocinereus.*
Whitiſh grey Hudrophanes without veins.

This is the ſtone which authors have imperfectly deſcrib'd under the names of Lapis Mutabilis, and Oculus Mundi.

It is a ſmall ſtone of a compact and firm texture, of a ſmooth and even, but not at all polite or gloſſy ſurface, very uncertain in ſhape, being ſometimes flat, ſometimes oblong, and oftener round, or nearly approaching to that figure, and from one tenth of an inch to half an inch in diameter. It has no ſtreaks, ſpots nor veins, but is of one plain, ſimple and uniform colour, which is of a pale, whitiſh grey. It breaks with a ſmooth and even, but not gloſſy ſurface; and, held up againſt a good light, has a ſmall degree of tranſparency.

It very freely and readily gives fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It burns to a pale fleſh colour.

Examined by the Microſcope, it appears of a leſs ſmooth texture than any other of the ſemipellucid ſtones, or at leaſt, of a leſs ſmooth ſurface; for as the Nephriticus's have always a greaſy look on their ſurfaces, even when ever ſo well poliſh'd, ſo this has a kind of ſcurfineſs on it, whether it be its cut and wrought, or its natural ſuperficies that is viewed.

The moſt amazing property of this ſtone however, and what is the great character of theſe Gems, is, that if it be thrown into a baſin of pure clear water, in the ſpace of half a minute it begins to change its appearance, and very ſoon, inſtead of an opake whitiſh grey, becomes of a very bright, and conſiderably pellucid, pale yellow, like that of amber, or the yellow Cornelian: this it retains as long as it remains in the water, but as ſoon as it is taken up, and the water begins to dry upon it, it by degrees reſumes its grey colour, and quickly becomes as opake as before.

The two ſpecimens I have ſeen of this ſtone, which indeed are all I have heard of, at preſent in the hands of the curious, were both from China. I make no doubt but other parts of the Eaſt-Indies, and indeed other parts of the world alſo produce them. I have found once or twice little ſtones in Hackney-River, near London, which had much of the character, and property of it; and made experiments with

them,

them, tho' with leſs ſucceſs than with thoſe I have ſeen from China. The moſt eminent Mr. Boyle deſcribes the experiments he made with one; and *De Laet* talks of two, one that he had ſeen only, another that he had in his poſſeſſion; but theſe he deſcribes as whiter than what I have ſeen: this, however, is a variety very common in ſtones of this colour, and, I doubt not, but the ſpecies was the ſame, tho' he ſeems alſo to talk too ſanguinely of the effects of that ſhewn him by a friend.

2. *Hydrophanes albidocinereus flavo variegatus, nucleo centrali nigerrimo. Qui oculus beli authorum.*

Whitiſh-grey Hydrophanes variegated with yellow, and with a black central nulceus. The Oculus Beli of Authors.

This is a very elegant and beautiful Gem, and is in the greateſt part or baſis of the maſs of a pale whitiſh grey, very much reſembling that of the former ſpecies, but variegated always with yellow and black, and often with an intermixture of a rediſhneſs and of white. It is of a very compact, even and firm texture, of a ſmooth and equal ſurface, irregular in ſhape, but generally flattiſh, and thicker in the middle than at the edges, and in ſize generally of about an inch diameter. The outer part of the ſtone, or that toward its edges, is ever of the whitiſh grey, before deſcribed, and that generally pure and unmixed, tho' ſometimes it is ſtreaked with yellow or with reddiſh. What there is elſe fixed and invariable in the ſpecies, is, that there is ever a central nucleus, of a pure black, ſurrounded by a broad circle, of a pale yellow, and repreſenting very elegantly the pupil and iris of the eye. Theſe are environ'd by, and incloſed in the matter of the ſtone, and are often ſurrounded by like concentric circles, of a pale flame-colour, and a very pure and beautiful white. Sometimes there are many of theſe circular zones, as regular as if drawn by a nice pair of compaſſes; but more frequently the ſtone conſiſts only of the black nucleus or pupil, the yellow iris, and the greyiſh white ſubſtance filling up the place of the white of the eye. The ſtone does not ſeparate at theſe zones in the breaking, but breaks irregularly, any where, and with a ſmooth, polite and gloſſy ſurface. It is very hard, and capable of a tolerable poliſh.

It very freely and readily gives fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a greyiſh white.

Examined by the Microſcope, its grey part appears ever of a rough or duſty ſurface, like the former ſpecies; the yellow iris, or broad circle, is very bright, pure and pellucid; and the nucleus is ſomething of the texture and appearance of the common matter of the ſtone, but more opake, and tho' of a very deep black, is never very bright or gloſſy: the other circles of white and flame-colour, add a great beauty to the ſtone, where they are; they are ever very narrow, and reſemble the zones of the fineſt onyxes in every reſpect.

This has much of the property of the former ſpecies, when plunged into water, tho' no body has happened to obſerve it before. The whole ſtone, on being immerſed, ſoon becomes more bright and pellucid, but particularly its outer ſubſtance, which changes colour very little leſs than the former, becoming always of a yellowiſh hue.

There are many ſtones improperly called by the name of Oculus Beli, but the genuine ſpecies is very rare: I have more than once indeed met with fragments of the outer ſubſtance of it among India ballaſt, but never any more than once ſaw a perfect ſpecimen. Our lapidaries make it much more common; at leaſt, they have ſomething common enough which they ſell under its name; for as nothing is more common in the Agates of all places than little circular veins round a central ſpot, they cut theſe out with a proper part of the ſtone about them, and call them by this name. Theſe are not only very common, but very beautiful, and are not peculiar to the Agate; I have of them in Carnelians and ſome other ſtones; they ſometimes ſtand ſingle, and ſometimes two or three near together, and, according to the colour of the zones, repreſent the eyes of various animals. De Laet gives an account of ſix of theſe eyes, that he had, and all very beautiful, but all, I believe, of the ſpurious kind, and cut out of proper parts of the ſtones they were once only variegations in.

Pliny ſeems to have been well acquainted with this ſtone, and has given us a very good deſcription of it in the more common ſtate, in a very few words: *Beli oculus albicans, pupillam pingit nigram e medio aureo fulgore lucentem. Hæc propter ſuam ſpeciem ſacratiſſimo Aſſyricorum Deo dicatur.* L. 37.

SERIES III.

Class II. Order I. Genus IV.

PRAMNION.

THIS is a perfectly diſtinct Genus of Foſſils, tho' there be at preſent only one ſpecies of it known. It is a ſemipellucid Gem, highly debaſed by Earth, appearing perfectly opake, unleſs held againſt a ſtrong light, and then manifeſting a colour not diſtinguiſhable in it before, which in all the varieties of the ſpecies at preſent known, is red in ſeveral degrees, and the ſtone perfectly pure and equal in colour, and free from clouds, ſpots or veins.

1. *Pramnion Morio ſive Morion dictum.*
The Morion and Pramnion of the antients.
The black Agate of the modern Lapidaries.

This is a very ſingular ſtone, and of very great concealed beauty: our Lapidaries, when they meet with it, know it by the name of the black Agate. They are ſo very indeterminate in their diſtinctions of things, however, that they call often poliſh'd fragments of black marble and other ſubſtances, by the ſame name, never looking for the great and diſtinguiſhing character of the ſtone, its hidden colour, but calling every ſmooth, black ſtone by the name they have allotted to it.

It is of an extreamly cloſe, compact and firm texture, of a ſmooth and equal ſurface, and in ſhape is very irregular, being ſometimes round, ſometimes oblong, and often flat; in ſize it ſeldom exceeds two inches. It appears, on a common inſpection, to be of a fine deep black, but, held up againſt the ſun, or the light of a candle, plainly diſcovers itſelf to be of a very glorious and elegant red, only clouded by ſo large a quantity of a ſubtile black Earth, as to be kept from diſcovering it by any other means. The ſtone, examined by this light, never ſhews the leaſt cloud of deeper colour in one part than in another, tho' it is often more or leſs opake from an irregular admixture of its Earth in different parts; but, however that is ſpread thro' it, the colour is diffuſed with perfect regularity, and has never, ſo far as has yet been obſerved, the leaſt appearance of ſtreaks or veins. Its red, which it thus diſcovers, is of different degrees from the pale flame-colour of the Hyacinth, to the deep glow of the ſorane Garnet; but moſt frequently it has ſomewhat of a purply tinge, and reſembles the deep Oriental Amethyſt. It breaks with a perfectly ſmooth ſurface, and is of great hardneſs, and capable of an elegant poliſh.

It very freely gives fire with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It burns, in a ſtrong fire, to a very pale grey.

Examin'd by the Microſcope, in ſmall pieces, it appears plainly a red or purple Gem, the blackneſs or opacity being no more diſtinguiſhable here, than the colour and tranſparency are to the naked eye. It ſurely indeed is altogether the Gem, and appears little inferior to the Oriental Amethyſt or Ruby. I have many times had occaſion to obſerve in the accounts of the Jaſpers and Agates, that the debaſing Earth is ſeldom the thing that gives the colour to thoſe ſtones, but that their opacity and tinge are owing to two abſolutely different admixtures. In this ſtone we have a very plain inſtance of the truth of this general aſſertion, ſince nothing can be more evident than that the black Earth which debaſes the cryſtalline matter into an opake ſubſtance, has no ſhare in the colour that ſubſtance has alſo received, which undoubtedly it has, like all the Gems, from metalline particles; and this having ſo much of that tinge, approaches indeed more to the nature of the Gems than any other ſemipellucid ſtone.

We have it from the Eaſt-Indies, among other ſtones, but it is not common, or much regarded now, tho' it is very plain that there have been times when it was much eſteemed. Pliny tells us, that it was among the Romans judged a fit ſtone for that ſort of engraving, for which we uſe the Sardonyxes and Cameas, and we find many antiques, ſome of conſiderable ſize; cut on it.

There is not perhaps any ſtone which has been leſs known or more miſunderſtood than this. Pliny's account of it however, if any one had thought of holding it up to the light to examine it, could not but have aſcertain'd what it was, ſince there is no ſtone but this which can anſwer his deſcription of being of a perfectly deep black, yet pellucid, and with an admixture of the colours of the Ruby or Carnelian; for ſo he expreſſes what I call the Hyacinth colour in it. *In qua miſcetur & Carbunculi colos vocatur Alexandrinum: ubi Sarda Cyprium, &c.* are his words. It is proper enough to enumerate the varieties of colour, as this author does, in its deſcription, from what might ſeem a pure deep black alone, to the paleſt admixture of red; but theſe are not different ſpecies, and the ſtone is the ſame in all things, but degree of colour. De Laet had ſome ſpecimens of this ſtone, and truly and properly underſtood the accounts of the antients about it. De Boet was greatly in the wrong in imagining it an Onyx, ſince it has not the character of that Genus; and Agricola was more in the wrong to imagine it a Spar, ſince all Spars ferment with, and are diſſolved by Aqua Fortis; and this ſtands that teſt unhurt, and proves itſelf to be evidently cryſtalline.

I have obſerved in another place, that the antients uſed the word μέλας black, in a very looſe ſenſe, and applied it to all the Gems of a deep colour; they had by this means what they called black Sapphires, Carnelians, &c. that is to ſay, deep-blue Sapphires, and deep-red Carnelians. De Laet has extended this uſage of the word black to this ſtone, and thinks they did not mean abſolutely black, but only deep-colour'd by it; but that, I think, is needleſs, ſince our workmens obſervations have led them no farther than to call it the black Agate; and it is obvious that no colour but black appears in it, even in thoſe which have the paleſt red in them, when viewed any but the right way. The ſame author deſcribes one in his own poſſeſſion alſo, which he ſays, appeared black and opake at firſt ſight, *nigri quidem coloris, & opaca primo intuitu*; but held up to the ſun or candle, he tells us, it had the deep colour of the Carbuncle; there could be nothing improper therefore in the antients naming a ſtone from its moſt obvious colour, or in our underſtanding the word in its ſtrict ſenſe. What Pliny mentions of the Carbuncle or Carnelian colour mixed in them, I imagine was never meant of their ſhewing it externally, for I have ſeen none that had any other than a plain black, till held to the light; and thoſe which De Laet mentions he expreſly ſays were alſo ſuch, and either called by the Jewelers by no name at all, or by that of Agates, by which they know them to this day. Its hardneſs is no other than that of the Agates, otherwiſe its colour would make one think it partook of the nature of the fineſt Gems.

SERIES III.

CLASS II. ORDER II. GENUS I.

ACHATÆ. AGATES.

Semipellucid Gems variegated with veins and clouds, but without Zones: compoſed of cryſtal, debaſed by a ſmall quantity of earth; and not formed by Incruſtations round a nucleus, or made up of plates; but ſeemingly the effect of one concretion, and variegated merely by the diſpoſition the fluid they were formed in, gave their differently coloured matter.

SECT. I. AGATES, with a white Ground.

1. *Achates Albicans Venis Albidioribus, Arborum & Muſcorum Delineationibus frequenter ornatus.*
Lapis Mochoenſis Artificum; Dendrachates Authorum.
The white veined-white Agate with delineations of trees and moſſes.
The Mochoa Stone of the Lapidaries.

THIS is an extreamly elegant and beautiful ſpecies of Agate, and deſervedly eſteemed next after the Onyxes, as of all ſtones the moſt approaching to their nature.

It is of an extreamly firm, compact, and fine texture, of an irregular, rugged, and unequal ſurface, very uncertain in ſhape and ſize, but moſt frequently of the figure of the ordinary flinty Pebbles, and from one to eight inches in diameter. It is evidently compoſed of a mixture of no other than two ſubſtances, pure cryſtal and fine ſubtile white earth; this is in different proportions in the different parts of the maſs; and thence alone is the difference of colour and tranſparence in the ground, and veins; the former being the more clear, pure, and pellucid, as having the ſmaller admixture of earth; the latter, or veins more opake and white, as having more of it; this, however, is in various degrees in the different ſpecimens, but the ſubſtances are ever in all caſes very regularly mixed, and have nothing of the cloudineſs or miſty look of the Chalcedony, even where much more opake than that ſtone. The veins of this ſtone are very beautifully diſpoſed in a number of various figures, but generally in form of many of concentric, irregular circles, drawn round one, or often two or three different points in different places. They are in general very narrow and thin, and often not unaptly reſemble, particularly in the parts neareſt their ſeveral centers, the zones of the Onyxes. They are generally a little whiter than the ground, though often ſo little, as ſcarce to be diſtinguiſhable in the maſs, without a very nice obſervation. It breaks with a very ſmooth, even, and gloſſy ſurface, and is very hard, and capable of an elegant poliſh.

It freely gives fire with ſteel.

It makes not the leaſt effervesſcence with Aqua Fortis.

It burns to a pure white.

Examined by the microſcope, it appears in the ground very nearly of the purity and cryſtalline texture of the Onyx, and in the veins very bright and beautiful, though a little more opake; the earthy matter is ſo intimately mixed, and regularly diffuſed here, through the whole maſs, that though the veins are more or leſs opake in different places, there is no more poſſibility of diſcovering what makes them ſo, when they have moſt of it, than when they have leaſt.

It is common in various parts of this ſtone to find very beautiful delineations of trees, moſſes, ſea-plants, and a multitude of figures of a like kind, ſo elegantly expreſſed, that many have believed real moſſes and ſea-plants included in the ſubſtance of the ſtone; this, however, is abſolutely erroneous, no ſuch thing having ever been really found there; nor, I hope, would the moſt ſanguine of the advocates of this opinion tell me, that the little tufted oaks, and other trees, ſo frequently repreſented in it are real trees, when they are ſeldom of more than half an inch in height: theſe figures are in black, and the ſtone itſelf being ever in white, they are ſeen to great advantage. Their true hiſtory is no more than this, that the ſtone is ſubject, like our common flints, to imperceptible cracks and flaws, into which the ſteams or effluvia from minerals ando ther foſſil bodies, continually pervading the whole ſtructure of the earth, find their way; and perhaps in ſome caſes water itſelf, has at ſome time been in them; either water, or theſe vapours, we well know, may be naturally enough tinged with black, or capable of leaving a black tinge on the ſurface of the bodies they have long remained on; and theſe finding their way into the natural cracks and ſmall crevices of the ſtone, have from the ſides of theſe inſinuated themſelves farther and farther into the maſs, and run into branched figures; or the water, where originally included in ever ſo ſmall a quantity, has, as the ſtone contracted more firmly, ſpread and diffuſed itſelf into the various detached figures we ſee; for all the delineations in theſe ſtones may be referred either to theſe looſe detached figures, or cloudy ſpots, or to thoſe which evidently ariſe from the ſides of a long crack, or fiſſure. That water is continually, to this day, getting into theſe natural crevices in ſtone, and diffuſing itſelf beyond their limits, in irregular, and often very elegantly branched figures, we ſee in many of our gravel-pits where the largeſt flints and pebbles being ſtruck, fly to pieces at their natural crevices; the ſides of which are often found very wet, and always with the marks of waters having been there; and if other parts of the ſame ſtones be examined, we generally find in them plain, though but faint tendencies, to the delineations in theſe Agates; and the very ſame often on their ſurfaces. That the ſteams or mineral effluvia pervade almoſt all Foſſile bodies, we find numerous inſtances; but what makes moſt for the preſent purpoſe, is, that we find them whereever there have been cracks, in many of the harder kinds of the Septariæ, frequently affording what the Lithologiſts call Dendritæ, or fuliginous delineations of trees, &c. ſo far from being inferior, that they infinitely excel thoſe of the Agates, and would be ineſtimable, were they in as valuable a ſubſtance. Nor is this the only inſtance, in which theſe delineations appear common, and merely the effect of theſe ſteams; the very ſurfaces of the Septariæ are often overſpread with them; and ſo poor and low a ſubſtance as chalk is not without them: many chalk-pits afford them in different places, but none ſo fruitfully; ſo far as I have ever obſerved, as the great chalk-pit on the edge of the Ballaſt-Hill, between Deptford and Black-Heath. The chalk there, is, throughout the whole pit, full of a multitude of horizontal crevices, and naturally breaks off into thin flat pieces, on both ſides of which, and that throughout the whole pit, there are delineations in black, of trees, &c. ſo beautiful, that nothing I ever ſaw in theſe Agates, can compare with them. If it were poſſible that any one could, notwithſtanding this great plenty, imagine, that theſe were real remains of vegetables, a little farther ſearch among this chalk will convince him of the contrary, by ſhewing multitudes of figures, not in the vegetable world, nor indeed in *rerum natura*, otherwiſe than in theſe elegant diffuſions, of a ſubtil matter, by which they are formed, which is merely as are the branched figures between two levigating ſtones at the colour ſhops, the ramifications of ſalts in chymical veſſels, and the elegant figures of plants, &c. in the hoar froſt on windows.

The delineations in this Agate, are, I am very ſenſible, frequently, and indeed moſt commonly found, deep in the ſtone, and near its center, and do not reach, viſibly at leaſt, far into its matter toward the ſurface. It was for this reaſon, that I hinted the poſſibility of their being from water left in the ſtone *ab origine*, and at the time of its firſt concretion; in which caſe, the ſhrinking of the ſtone into a ſmaller compaſs, and the known properties of water could not fail of producing this very effect in the natural cracks of the ſtone; which we alſo know, in the moſt familiar inſtances, appear very near the center, and thence only extend toward the ſurface: this may therefore have been the caſe, but how far theſe cracks may have reached beyond what we are able to trace we cannot tell, perhaps even to the ſurface. I have, from the origin of theſe delineations, often traced the crevice they were owing to, much farther by the microſcope than the naked eye could perceive it, though never indeed nearly to the ſurface; but how far, if it were poſſible to make the proper parts of the ſtone a more handy and manageable object, it might be ſeen, I cannot determine. If to the ſurface, though in ever ſo ſmall a diviſion, there is no doubt of theſe effluvia finding their way into it; and the conſequence of that would be, that as the crack ever grows wider toward the center, (as I have, in a thouſand inſtances, and without all exception, obſerved it) the matter of theſe effluvia would have more opportunity of acting and diffuſing themſelves from its ſides, in form of a ſeries of Dendritæ. Thus far, at leaſt, obſervations countenance this opinion, that whole lines originally cracks, affording double rows of theſe delineations, are frequently ſeen tending directly from toward the ſurface to the center of the ſtone; theſe all become thicker, that is, the crack becomes larger as it approaches the center; and the Dendritæ, which are there largeſt and longeſt, become ſhorter and ſmaller, often very regularly (though ſometimes with interruptions from natural flaws in the ſtone, giving room for larger) toward the ſurface, till at about an inch from the center they are loſt: the plain black line, however, that is the crack, may be always traced a little farther; and, I have often ſeen, that by holding a poliſhed plate, with one of theſe in it, up to the light, in various directions, I have been able to diſcover a thin plate of a blackiſh colour going through the ſtone, in the ſame direction with the line, and appearing plainly enough, from the analogy with the cracks of our own flints, to be the continuation of a crack, extreamly narrow, but coated or filled up with the leavings of the fluid or vapour, that had once filled it, and formed where it had more room theſe elegant figures.

Theſe delineations have ever made this a very valuable Stone; but our Jewelers and Lapidaries, willing to loſe no part of it, have of later days found out new uſes for thoſe veined parts of it, where there are none of theſe figures: theſe they cut tranſverſely in the proper places where the veins moſt reſemble the Onyx Zones, and either paſs them off in this ſtate for Onyxes, or ſtaining them, as before obſerved, make them what they have taught us to call the Sardonyx.

This elegant ſpecies of Agate is found only in the Eaſt-Indies. We have ſomething imperfectly reſembling it from Germany, but it is only a baſer Agate, with theſe delineations, which may happen, as before obſerved, to any ſtone, and are common, in ſome degree, even to our Engliſh pebbles. It was long ſuppoſed, that theſe Agates were produced in the place whence they have their name, Mocho; but it has been proved, by the perſons who trade in them, that that is not the place of their production, but merely the place they were carried to for the convenience of trade. This was done with great care, and ſome expence, with a view to get a high duty taken off from them; but though it failed of ſucceſs in that reſpect, it has given ſo much knowledge in the hiſtory of the ſpecies, that, we are very certain that, though many parts of the Eaſt-Indies produce them, they are not found there.

Pliny tells us, that the Agate had been before his time in great eſteem in Rome, but that it was then become leſs valued. He particularly mentions this ſpecies, under the very name Dendrachates, and tells us of its containing the figures of trees, &c. *Velut arbuſcula inſignis* are his words in one place, and in another *reddunt enim ſpecies nemorum, fluminum, &c.* He carries on the account of the figures a good deal farther; and indeed a fertile imagination may form almoſt any thing out of one part or other of the lines in it. We find it mentioned by all the old authors. Orpheus has very poetically and elegantly deſcribed it under the ſame name; and tells us, we may ſee in it numbers of trees, as if in a fertil garden, and that it was thence people had given it its name: his words are,

'Ει ϗ δενδροφύτοιο φέροις τρύφος εν χερὶ πέτρης
Μᾶλλον δε τρέποιο θεῶν νόος ἄιεν ἐόντων
Δένδρια γὰρ μάλα πολλὰ κατόψεαι ως ἐνί κήπω
'Ανθεμόεντι, κλάδοισιν ἒπασσυτέροις κομόωντα
Τοὔνεκα ὅι ϗ φῶτες ἀχάτη δενδρήεντι
Θηκαν ἐπωνυμίην ὅτι ὁι τὸ μὲν ἔπλετ' αχατου,
Ἄλλο δἔχει λασίης ὕλης δέμας εισοραασθαι.

This is unqueſtionably, not only a poetical, but a very juſt deſcription of this ſpecies: and the Author, concerning whom, whatever the criticks may judge in regard to the reſt of his works, I am very clearly convinced, that he wrote this before any other book on the ſubject now remaining in the world was thought of, has given us a taſte here of the plain ſimplicity of the Antients in their deſcriptions; his imagination of its virtues in pleaſing the Gods, was the folly of his time; and if he had written without it, we might thence have concluded, he lived much later than his name would import. Indeed, one great proof of the genuineneſs of this work, is, that it contains not too much knowledge, nor any other knowledge than what the beſt lights we have into the hiſtory of ſuch early times, will give us room to think they had. But if his virtues for this ſtone are idle and imaginary, his deſcription of it is real and juſt, conſonant to nature, and modeſtly delivered; and we ſee, by conſulting what has been ſince written, that, as I have often * elſewhere obſerved, the Authors, who wrote afterwards, deviated into error in many places, in deſerting, or adding to theſe accounts. We accordingly find Pliny adding to this plain deſcription the abſurdities of a vitiated imagination, in diſcovering reſemblances of things, wildly, or rather but imaginarily figured by the courſe of the matter, and telling us of not only woods and rivers, but the figures *Jumentorum* of flocks and herds, and *Eſſeda, Staticula, & equorum ornamenta*, decypher'd in it. *Solinus*, and his other followers, copy and improve upon theſe idle fancies; and the old *Marbadæus* gives us his ſanction of part of them,

Reddentem varias facies dat & Indus Achatem
Nunc nemorem frondes, nunc dantem ſigna ferarum.

Had it been our misfortune not to have fallen upon any of this ſpecies, ſince the the days of theſe Authors, how readily ſhould we have determined from theſe ſtrange accounts, the whole hiſtory to be a fiction. And this I am very apt to believe to be the very caſe in regard to many of what we call the loſt Foſſils of their times, many of which have been at times diſcovered, after being for many ages given up for loſt; and many others, perhaps, all lying in one part of the earth or other, ready to diſcover themſelves with theſe limitations to the firſt accurate obſerver.

2. *Achates lacteus hebes.*
Dull milky looking Agate.

This, tho' much inferior to the precedent in brightneſs and tranſparence, is a very elegant and valuable ſtone. It is of a moderately fine, and extreamly cloſe, compact and firm texture, of a very rude, rugged and unequal ſurface, very irregular in ſhape, but generally ſomewhat reſembling the form of our rugged Flints, and in ſize from one to ten inches in diameter. It is generally abſolutely free from veins, but when it has them, they are ever nearly of the ſame colour with the reſt, and diſpoſed in the form of irregular concentric circles round one or more points, often two or three in the ſame maſs. It is of a very pleaſing colour, very like that of milk before the cream has been ſeparated from it, and, if any thing, with ſomewhat of a more cream-like look. It breaks with a very ſmooth, gloſſy ſurface; and is very hard, and capable of an elegant poliſh, but conſiderably opake, even when in thin plates.

It very readily gives fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a pure ſnow white.

Examined by the Microſcope, it appears of one pure ſimilar texture, and is plainly a criſtalline matter, with a large ſhare of earth, evenly diffuſed through, and perfectly blended with it. Where there are any veins, the Microſcope ever diſcovers on the outſide of them a multitude of others ſo minute and ſlender as to eſcape the naked eye; but where there are none of the larger, I never met with theſe fine ones, on the moſt ſtrict ſearch.

This ſpecies is common on the ſhores of rivers in the Eaſt-Indies, and is found, tho' leſs beautiful and more debaſed by earth, in Germany, Bohemia, and even in our own country, but here very rarely.

Our Lapidaries ſometimes cut it into counters for card-playing, and other toys of ſmall value, but it is but little eſteemed.

I have mentioned in this and the former ſpecies what is common in the reſt of the Agates alſo, that their veins are diſpoſed in concentric, tho' irregular circles round a certain fixed point. This, to a ſlight obſerver, might make them paſs for ſo many cruſts added round a central nucleus, as in the Onyxes; but a cloſe examination will ſhew that this is not at all the caſe, and that the Onyx and Agate differ abſolutely ly in their origin and formation, and are, were it for that alone, quite diſtinct Genera of ſtone. I have before obſerved, that the central nucleus or baſis of the Onyx is ever a cryſtalline matter, more pure than that of the ſtone round which the afterward-added matter is regularly diſpoſed in cruſts, or laid on it in plates or tables, each way making regular zones; the Agate, on the contrary, has no fixed central baſis, nor regular zones; but as the former is the effect of numerous freſh-added cruſts of matter to a nucleus and to one another, this is evidently the effect of one ſingle concretion, the whole maſs that makes the ordinary pebble-ſhap'd Agate, having concreted at once, and coaleſced into that lump, as prevented from aſſuming the proper figure of Cryſtal by it debaſing earth. Were theſe ſtones formed as the Onyx, by incruſtations, there could be, as in them, only one central point in each ſtone, for the circles to be formed round; whereas in theſe there are uſually two, often more, and thoſe with many of the veins continued to each, ſo as to leave no poſſibility of their having been two ſtones fallen together; which would be the moſt natural conjecture for the accounting for their formation by the way of ſucceeding cruſts; but were this their formation, the changes of the veins muſt be different in each, and diſcontinued between one and the other aſſortment: but this is not the caſe, nor is the point, round which they are formed, a central nucleus of different matter. They are, however, if we look back to the origin and formation of the ſtone, very eaſily and plainly accounted for in another manner, and that without the help of any other agent than what we are very ſure was ready to aſſiſt in it. We are to ſuppoſe then a maſs of cryſtalline and earthy matter mixed for the formation of the maſs of this ſtone; and for the veins, a ſmall quantity beſides, with a little more earth in proportion than is in the reſt; which it is indeed evident, is the caſe in regard to the veins: theſe two parcels of matter have been thrown together in a fluid in motion, and conſequently capable of communicating motion to them; and if we would know the effect of this where the different parcels of matter are not abſolutely blended, let us only mix two fluids of any kind that will not immediately blend with one another, and ſhake the veſſel they are contained in, or otherwiſe give them a ſlight motion, and we ſhall ſee it: or in even the moſt obvious and familiar of all inſtances, if we obſerve only the effect of pouring a ſmall quantity of cream into a cup of tea, and ſlightly ſtirring it, we ſhall ſee the thicker fluid the cream, diſpoſe itſelf on the ſurface into a number of irregular concentric circles round one or two points, exactly in the form and manner of the veins in theſe ſtones; and may thence learn how they might naturally come by theſe veins. The motion of the ambient fluid, in which theſe ſtones concreted, was certainly capable of communicating the neceſſary motion to the maſs for the ſpreading the thicker matter, and the only difference in the two inſtances is, that in the one the two fluids continuing fluid, ſoon looſe the configurations by blending intimately together, whereas in the caſe of the Agates, the maſs concreting into a hardneſs, has retained the form and diſtribution the motion had given its thicker part. It may be obſerved that this has been a kind of critical hit, where we find the Agate in this ſtate; for that two ſuch ſubſtances might very eaſily abſolutely unite and become blended into one maſs; and ſo it frequently is the caſe, many more ſpecimens of this particular ſpecies being found with the two ſubſtances thus diffuſed, than any other way, and ſhewing no veins at all. And probably the ſame is very frequently the caſe, tho' not ſo eaſily aſcertain'd in many other of the Agates.

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* Commentaries on Theophraſtus.

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3. *Achates albido plumbeus nigro & albo variegatus, Qui Phaſſachates, ut & Leucachates, & Perileucos antiquorum.*
Lead-coloured Agate variegated with black and white.
The Phaſſachates or dove-colour'd Agate of the Antients, as alſo their Leucachates and Perileucos.

The deſcriptions the antients have left us of their Leucachates and Perileucos, with what we have been uſed to underſtand in regard to the Phaſſachates from them, may give the critical Naturaliſt an odd opinion of my venturing to make them one and the ſame ſpecies; but experience and obſervation will warrant it. I have had occaſion to obſerve before, that the ſame Agate makes a very different figure in different ſpecimens, from the various proportion or manner of mixture of the ſame conſtituent particles; and obſervation will ſhew, that this is no where ſo remarkably the caſe as in the preſent ſpecies.

This is, notwithſtanding its ſmall variety of colours, a very elegant and beautiful ſpecies. It is of an extreamly fine, compact and firm texture, of a rugged and unequal ſurface, generally of an irregular figure, reſembling that of our common Flints, and from one to three, and ſometimes four inches in diameter. It is very various in its ſhape and appearance, and in the diſtribution of its colours in the different ſpecimens. Its ground or baſis is ever of a pale bluiſh grey, or what we call a lead or dove-colour. Sometimes it is equally and evenly of this ſingle colour throughout the whole maſs, but often it is variegated within, with veins of a deep black, and others of a moderately clear and fair white. Sometimes theſe veins ſhew themſelves even on the ſurface, but more frequently they are only toward the center of the ſtone, and are ever diſpoſed in the uſual manner of the veins in theſe ſtones, in a ſort of irregular concentric circles, round one, two or more points; the black veins are generally but narrow, the white often very broad. None of the Agates ſo nearly approaches to the Onyx Genus as this ſpecies; and tho' the diſtinctions between the two Genera are as fixed and certain as any thing in nature can be, yet I have ſeen pieces of this ſtone cut tranſverſely out of proper parts of the maſs, that would at firſt ſight have puzzled a good Naturaliſt to diſtinguiſh them from Onyxes. It breaks with a fine ſmooth, gloſſy ſurface, and is extreamly hard, and capable of an elegant poliſh.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a duſky grey.

Examined by the Microſcope it appears a duſky, and not very beautiful ſtone. It is of a very even ſtructure indeed, but its colours are no way ſtriking. In this view however we diſcover a plain fact, which not a little helps to illuſtrate the hiſtory of the ſtone, which is, that in many places between the black and white veins there is plainly diſtinguiſhable a ſlender and very irregular greyiſh line of the ſame kind of colour with the common matter of the maſs, only a little darker, and on the external edges of the black veins, where they touch the grey matter of the maſs, there is a like line, only a little darker than the former; theſe are never regular or even, like the veins themſelves, but ragged, undulated, and broader in ſome parts than others.

To account at once for theſe and the general hiſtory of the ſtone, we are to conſider that, as has been before obſerved, the matter which makes the veins in theſe ſtones is no other than a debaſed cryſtalline ſubſtance of the ſame kind with the ground, but differently coloured; this, if it happen to be added to the maſs, when either one or both of them are pretty far concreted, remains in clouds or ſpots in it: if, when ſomething leſs ſo, it diſpoſes itſelf into veins, and according as the matter of the maſs has been more ſoft, it is moſt certain, that the veins have ever flowed more freely, and diſpoſed themſelves more beautifully amongſt it. The diſpoſition of the veins in this ſpecies, ſhews it to be one in which they have generally flowed freely and eaſily; and if we ſuppoſe, in ſome inſtances, the matter of the veins alſo to have been a little ſofter than ordinary, we ſhall not wonder that it ſhould a little blend itſelf with the ſubſtance it touched at its edges, whether that were the ſubſtance of the maſs, or an adjoining white vein: it is eaſy to determine that a little blending together of theſe two colours at the edges muſt make, by a mixture of both, exactly what we ſee in the undulated or clouded line, here deſcribed, between the veins, or on the ſurface of the external one. This is plainly the caſe in ſome, and not in others of theſe ſtones; and there needs no more to convince us that the plain bluiſh Agate or Phaſſachates of the antients, and their black and white vein'd or Perileucos, are the ſame ſtone, than to obſerve that the ſubſtance of the outer covering and common matter of the Perileucos is ever the very ſame thing with the Phaſſachates, and that where we ſee the black and white lines blend with one another in this middle undulated line, they produce a colour not unlike it. And when after this we conſider how common it is to ſee the ſame Agate make a very different appearance, from its veins being more or leſs, or the ſubſtance of them in ſome caſes perfectly and entirely blended with the common matter, we ſhall readily perceive that the Leucachates or Pericleucos, that is, the black and white vein'd State, is the moſt common and natural appearance of this ſtone ; but that theſe veins blended among the matter of the maſs they are uſually contained ſeparate in, would produce the other variety or plain Phaſſachates. That there are genuine maſſes of this ſtone in which the veins and common matter are ſo blended as to make it but one plain, ſimple-colour'd ſtone, I am convinced, by having ſeen ſuch ; but were there not, if the antients had judged as ſome of our modern Lithologiſts have done, only from the ſtones they ſaw cut and poliſhed, they might very eaſily have been led to have made their two ſpecies out of the ſame maſs ; for a plate cut with the veins alone, and another out of the ground-colour alone, without any veins, muſt have appeared of two different ſpecies of ſtone.

This is found in the Eaſt-Indies, and in ſome other parts of the world. Our Lapidaries don't value it, but in Germany they make ſnuff-boxes of it, which are very beautiful. I am very certain that ſome pieces I have ſeen of it were European, but could not learn the particular places they were brought from.

Want of obſervation, and of the Critics and Commentators on the old Lithologiſts knowing ſomething of the ſubject they wrote on, have been the occaſion of ſome conſiderable miſunderſtandings in regard to this ſpecies. Pliny has fairly deſcribed it, but his Commentators would fain rob him of the honour of it : and Salmaſius is indeed for robbing the ſtone of its very being ; he will have the Phaſſachates of Pliny to be only a falſe reading for Jaſpachates, and delivers his opinion with ſuch an air of certainty, that an Author writing on theſe ſubjects from obſervation, not from other Writers, after having read him, would naturally believe the ſtone, if he had fallen upon it, an Agate unknown to the antients. I mention Salmaſius, as the author of this egregious alteration of Pliny ; but it is not that Critic alone that will be likely to miſlead us, for every body is getting into his opinion ; and father Harduin, who generally pays him too little reſpect, and neglects and deſpiſes him in many places where his criticiſms are juſt, and will be an honour to him for ever, here takes his word for an error, and has given us the word Jaſpachates in his edition. Dalechamp indeed, who is a very valuable Editor in many things, has kept the genuine word Phaſſachates ; and one would wonder that any one who did not perfectly well know, which is indeed impoſſible, that there was no Agate of a dove-colour, and knew that the Greek φασσα ſignified a wood-pidgeon, ſhould be at any loſs to imagine the word properly written, ſince nothing could be more probable, even tho' it were not certainly known, than that there might be a dove-colour'd Agate ; and this could not but be acknowledged a very expreſſive and proper name for it.

Pliny has mentioned the ſame ſtone in its veined and variegated ſtate alſo, under the name Leucachates, in his ennumeration of the various ſpecies of the Agate ; a name ſo little expreſſive of the particular character of this ſpecies, that it might ſo eaſily be underſtood of, and indeed properly enough applied to another ſpecies, that were it not that the other old Writers mention it as a ſynonymon of the Perileucos, as the ſame ſtone was more expreſſively called, one would ſcarce venture to affirm that it belonged to this ; the probable reaſon of its being given it is, that theſe Authors looked on the black colour in this ſtone as the ground, and called it the white Agate from its variegations with that colour. In the following part of this chapter the Author mentions it again, however under its more expreſſive name Perileucos, with ſomething of an imperfect deſcription of it, ſeemingly taken from the pieces of it, as the artificer choſe to work them ; for in the cutting, the veins may be made to fall in almoſt any direction. But Iſidore much better deſcribed it among the black Gems, taking, according to what ſeems to have been the old opinion, the black part, tho' generally ſmall in quantity, for the ground. I have before obſerved that the veins in this ſpecies generally lie toward the center of the ſtone ; and Iſidore has deſcribed them accordingly ; for he ſays, that it has *in medio circulos nigros & albos junctos & variatos.* The laſt words of which ſentence very happily expreſs the irregularity and double centers of the concentric circles I have deſcribed them to lie in : and it is from theſe circles that Epiphanius ſays the ſtone had its name Perileucos. Cardan alſo mentions this ſpecies, and the old Marbodæus tells us of an Agate which, tho' it be black, has white veins.

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* *Sit licet ipſe niger venis tamen obſitus albis.*

Theſe and the following ſeem to be all the ſpecies of Agates known in the world at this time, and moſt of them we ſhall find have been long ſo, the antients having been perfectly well acquainted with them, and diſtinguiſhed them by particular names: there is only one kind of the antients, which all the ſearches I have made have been able to give me no light about, that is the Antachates or Autachates of Pliny, as it is differently written in the copies. All the account we have of this is, that when burnt, it ſmells like myrrh. And Salmaſius from this will have it, that the true reading of the paſſage is Stactachates, the Myrrh Agate. Father Harduin laments that no good copy will bear him out in this conjecture; but I more lament that no ſpecies of Agate I have yet been able to meet with, will warrant the deſcription Pliny gives of its ſmell, when in the fire. I flatter myſelf that the ſpecies here deſcribed, are in reality all the ſpecies of Agates, and have tried them all, two or three of them indeed of which chips were not eaſy to be had, I could try only by the European kind, that reſembled them; but I never yet met with any one which had the leaſt reſemblance of this ſmell. What future experiments may diſcover I cannot ſay, but at preſent I am apt to ſuſpect that there never was any ſuch ſtone in nature, and that by ſome accident or other the paſſage of Pliny is ſo corrupted that we cannot at all gueſs at the author's original meaning.

I am ſenſible, that a man who would viſit only half the ſhops, cabinets, *&c.* that I have had recourſe to on this occaſion, might, if he did not ſet out with determining what ſhould be the fixed character of a ſpecies, draw up deſcriptions of almoſt as many ſpecies as he ſaw ſpecimens; but I am very certain all I have ſeen may be reduced to one or other of theſe, and that the characters are now ſo far fixed, that it may be poſſible to call every ſtone one meets with by its proper name. Deſcriptions founded on ſingle ſpecimens could give no general idea of the ſpecies they belonged to at all, and particular ſpecimens muſt not be expected each in every particular to agree to or limit theſe deſcriptions. It is enough that in each the true colours and genuine ſubſtance are determined, and the judicious obſerver will be thence able ever to refer each to its ſpecies. Sometimes one colour, ſometimes another, and ſometimes more than one are wanting in the variegated kinds, and at others the colours ſo run into one another as to make third colours; but every one who knows that every colour is not neceſſary in every ſpecimen, and that red and yellow make an orange-colour, and ſo of the other mixtures, will find no difficulty in avoiding errors in theſe caſes.

Pliny tells us, that the Agate had been in earlier ages eſteemed of very high value; but that, in his days, it was in no eſteem; and adds, that it uſed to be found in or near the river of the ſame name, in Sicily; but that it afterwards was found to be common in many other places; and this was undoubtedly the reaſon of its having changed its price and rank in the eſteem of the world. While one place only afforded it, its beauty could not but render it valuable; but when it became common, it became cheap, and of leſs eſteem. If we look farther back into antiquity, we ſhall find that this was true, and that this was really the caſe; for, in the days of Theophraſtus, it was very valuable, as we find by the expreſs words of that author, and bore a great price; and we have no other account whence it was brought, than that of the river Achate alone.

Καλὸς δὲ λίθ☉ϛ κὶ ὁ Ἀχάτης, ὁ ἀπὸ τȣ Ἀχάτȣ ποταμȣ͂ τȣ͂ ἐν Σικελίᾳ. ϗ πωλεῖται τίμιος. Ed. N. p. 86.

Orpheus alſo is of the ſame opinion in regard to it, and looks on it as a very highly valuable ſtone: it was therefore, in his days, in as great eſteem, as in the days of Theophraſtus; he even allots four chapters to it in his Βιβλίον περὶ λίθων, a thing he has done to no other Gem whatever. And all the commentators on the Antients on theſe ſubjects have taken particular notice of this. Father Hardouin is continually referring to this author in regard to the Agates of Pliny; and others take notice, that he has well deſcribed the various ſpecies. Salmaſius is continually referring to him on this ſubject; and it is an obſervation of him, repeated by three or four of the later Lithologiſts, *de Achate multa Orpheus libro*, περὶ λίθων, *laudes ejus quater repetens quaſi gemmæ Maximæ Dignitatis.* I am ſenſible, that the world has been taught by the Criticks to look on the works aſcribed to this author, as written of later days; but let them argue what they pleaſe againſt the antiquity of the Argonauticks and Hymns attributed to the ſame author; I have ſuch reaſons and arguments to prove the real and certain antiquity of the Βιβλίον περὶ λίθων, the only work I have any thing to do with here, to be authentick and unqueſtionably the oldeſt book we have on theſe ſubjects, that is to ſay, one of the oldeſt books in the world, as thoſe gentlemen, with all their reading, will find unanſwerable; theſe, I hope, will ſome time appear with an edition of that author's works, freed from the egregious errors of his editors: But, in the preſent caſe, we have no ill argument of his being truly an antient author; for had he written ſince the time of Pliny; he would, doubtleſs, have taken his accounts of things from Pliny, as every body elſe has; but this is evidently not the caſe, nor is it eaſy to be conceived where he could get other accounts than Pliny's, unleſs he had really written before him, ſince from whatever later author he had taken them, he would have found that that author had taken them from Pliny.

Theophraſtus is the oldeſt writer we know of, who has left us any thing of value on theſe ſubjects. Pliny has taken much from him, but he has alſo left much untouched, and has miſtaken ſome, nay, many of the things he has taken. Whoever will carefully read the three Authors, will find, that Orpheus's opinions agree much more with Theophraſtus's than with Pliny's, tho' very evidently taken from neither; and that he ſeems evidently to have had the ſame ſenſe of things that Theophraſtus had, which is frequently very different from that which Pliny has taken it in. This may naturally lead us to the hiſtory of the Stone under conſideration, the Agate. We find, that in the days of Pliny, it was cheap, and of no eſteem; nor has it, we are ſure, ever raiſed its value to any great pitch ſince. In the days of Theophraſtus, that is to ſay, in the times long before Pliny, we find, that it was extreamly valuable. What then are we to expect in the works of this third Author, if they were written either in Pliny's time, or at any time ſince; the Agate muſt be deſcribed in them, as a ſtone of no eſteem; if they were written before that Author, eſpecially if long before, the ſame ſtone muſt be recorded in them as of high value; for the ſame Pliny ſays, *Achates in magna fuit auctoritate, nunc in nulla eſt.* When we turn to this account of it in Orpheus then, and find it extolled almoſt beyond all other Gems, and deſcribed as of ineſtimable value, is it not evident, that thoſe verſes in which it is ſo deſcribed, muſt be older than Pliny, and written in thoſe very times, in which he tells us, it was in *magna auctoritate.* The ſort of value that Orpheus ſtamps upon it alſo is only reconcileable to the times in which he really lived and wrote, and is ſuch as no later Author could have ever conceived as the properties of a ſtone; theſe are the rendering a man charming in the eyes of his miſtreſs, giving eloquence to him who was poſſeſſed of it, the procuring a man all he wiſhed for, the curing the bites of ſerpents, and a thouſand other things as idle, but the very fancies, probably enough, of the earlieſt times. Orpheus talks of his having recommended it ſtrongly to Ajax, in the ſame chapters, and in many other places, indeed occaſionally, throughout the whole book, talks of Achilles, Hector, Menelaus, &c. as his companions; and any one who is acquainted with antient chronology, will readily agree, that the ſame Orpheus might have been a gay young fellow in the Argonautick expedition, and an old poet at the time of the Trojan war. This may ſtand as one of the many arguments in favour of the antiquity of the Βιβλιον περὶ λίθων of Orpheus; and it may not be improper here, to give his account of this genus of the ſemipellucid Gems. He ſets out with telling us, that it is a very multiform and very beautiful ſtone, appearing in the various pieces of very various forms; and adds, that a great number of diſtinct colours are continually found in it. This is his general character of the Genus; from which he deſcends to diſtinguiſh the different ſpecies, by telling us, that in one we ſhall obſerve the true matter of the beautiful tranſparent Jaſper; in another, the red of the Carnelian; in a third, the glittering green of the Emerald; in a fourth, the colour of the Reddle; in a fifth, that of Copper; and, in a ſixth, the variegated red and yellow of the ſummer Apple; but his ſeventh is the moſt valuable, he tells us, of all the others; and this is his Leonteſeres, ſo excellently deſcribed, as I have taken notice of in the hiſtory of that ſpecies: his words on the ſubject in general are theſe;

Καὶ πολυειδέα πίνε μετ' ακρήτου βρομίοιο,
Μορφὴν παντοίην ἐπιειμένον ἔσθλον ἀχάτην
Πολλὰ μὲν οὖν ῥέα γ' ἔστίν ἀχάτου χρώματ' ἰδέσθαι
'Εν γὰρ οἱ δήεις ὁρόων ὑάλωπιν ἴασπιν
Σάρδιά θ' αἱματόεντα ϗ αἰγλήεντα μάραγδον.
Εν δὲ ὅγε μιλτοπάρηος, ἀτὰρ κὶ χαλκὸν εν ἄυτῳ
Δήεις, ϗ χροιὴν ἐαροτρεφέος μήλοιο,

Theſe are the deſcriptions of this Author; and when we conſider, that we know but eleven ſpecies of the Agate, we ſhall not think the world, at that time, very ignorant, in acknowledging ſeven of them.

The original place for the finding theſe ſtones was the river now called Cantara, in Sicily; and many ſpecies of this ſtone are yet found on its ſhores. It ſeems, however, likely to retain its old name among the poets.

Silius Italicus calls it

Et Perlucentem ſpendente gurgite Achatem

And Rhennius commemorates the ſame old name in his account of the etimology of the name of the ſtone.

Comitur egregius hic lapis cui nomen Achates,
Hcc dederat fluvius cujus generatur ad undas.

Beſide Sicily, Pliny tells us, that theſe ſtones were afterwards found in Ruſſia, Ægypt, Phrygia, Parnaſſus, Thracia, Leſbos, and Rhodes. At preſent we have them from almoſt all parts of the world; our fineſt are from the Eaſt-Indies; next to theſe, and ſometimes equal to them, are thoſe of America; the next in value are the German, it is only ſome few, however, of theſe, that are of any great value, the generality of them being but coarſe and ordinary; the Engliſh are very ſcarce, and generally very bad, though ſome truly fine ones have been ſaid to be found here.

SECT. II. AGATES, with a reddiſh Ground.

1. *Achates impurior albido carneus.*
Fleſh-coloured white, impure Agate.

THIS is a ſpecies of much leſs elegance than either of the before deſcribed, but is not without its beauty. It is of a moderately fine, compact and firm texture, of a very rugged, unequal ſurface, generally of a roundiſh or pebble-like figure, and from one to ten inches in diameter. It is of a pale whitiſh colour, but with a ſlight admixture of a fleſh colour, not more than that of the blue in the Chalcedony, yet never entirely wanting in the ſtone; it is frequently pure, and abſolutely without veins, but is often alſo found clouded, ſpotted or veined, with a more opake, and ſomewhat redder matter; the veins are generally diſpoſed as in the former ſpecies in irregular concentric circles; the cloudings are of every indeterminate figure, and often very large, and the ſpots are frequently very elegant: ſometimes they are of the bigneſs of a pin's head, and notched at their edges, but much more frequently they are extreamly minute, not exceeding the ſmalleſt viſible dot of a pen in ſize; they are, in this caſe, often cluſtered together in great numbers, and often regularly follow the courſe of the veins. It breaks with a very ſmooth and gloſſy poliſh; but of all the ſtones, of this kind, it differs moſt from itſelf, at times, in its various degrees of tranſparency: it is ſometimes found very beautifully pellucid, and at others almoſt perfectly opake, nay, this not only in different ſpecimens, but often in the different parts of the ſame piece: the truth is, the baſis or common matter of the ſtone is naturally as pellucid as the oriental Agates, or very nearly ſo; and the veins and ſpots, or matter of the variegation, is more loaded with earth, and conſequently more opake. In ſome ſpecimens there are few, or perhaps no veins at all; theſe therefore remain very pellucid, while others, in which the veins take up a great part of the ſtone, or ſometimes nearly the whole, are either altogether or in great part opake: another reaſon I have alſo ſometimes met with, in a more remarkable variety, which is, that the matter of the veins has not been lodged in the maſs in form of ſuch, but taken up into, and perfectly and equally diffuſed through it, ſo as to make together but one equal maſs. The ſpecimens I have of this ſtone, in theſe three very different ſtates, might naturally lead an haſty obſerver to make three ſpecies of it, but this ſort of error is no where ſo carefully to be avoided, as in theſe large Genera. The Agates being really ſo numerous, in their truly diſtinct ſpecies, that it is difficult enough to fix their diſtinctions.

It very freely gives fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a pure white.

Examined by the microſcope, it makes a very elegant appearance; its ground, or baſis, is very pure and bright, and of a fine equal texture; its veins are very cloudy and opake; its larger ſpots with fimbriated edges, make a very elegant appearance, and are of a whitiſh fleſh-colour, but its great beauty is in the ſmall red ones; theſe appear almoſt inconceivably numerous, and are often diſcovered by this aſſiſtance in places where they are not diſtinguiſhable by the unaſſiſted eye; they frequently run along the veins in this minute ſize, as in the fine Sardonyx of the antients; and often, as in that ſtone, are the occaſion of the reddiſh colour.

It is found in Germany, Bohemia, and ſome parts of Italy, and is worked ſometimes into vaſes, but moſt frequently into counters for card-playing, and into gun-flints.

I have before obſerved, that the Agates ſometimes, beſides the accidental reſemblances of moſs ſo frequent in them, do really contain true parts of vegetables. I gave an inſtance of this in another ſpecies, in a ſpecimen in my own poſſeſſion, but have a yet more remarkable one in this, having a ſpecimen of it ſhaped for a gun-flint, which has embodied in it two large and very beautiful branches of a land Coralloide branched moſs, common in Germany and England, and deſcribed in Dr. Dillenius's hiſtory, under the name of *Coralloides Corniculis brevioribus & crebrioribus*. P. 104.

The ſtone has been ſo happily poliſhed over the part where this is lodged, that the tranſverſe ſections of ſeveral of the ſtalks moſt elegantly exhibit the natural cavity, and the true vegetable matter of the cortical part of the plant. Let me caution the young ſtudent in theſe things to be very careful, however, how he determine, things which appear of this kind in theſe ſtones to be real, the repreſentations of them are ſo frequent, that one ſeldom ſees a parcel of the ſtones together, but one or other of them affords them; but the real ſubſtances themſelves are ſo ſcarce in them, that in the multitudes of ſpecimens I have ſeen, there have been very few that could be determined of certainty to be ſuch. As to the manner of there being lodged there, there can be no difficulty in imagining it poſſible, when we conſider the vaſt quantities both of animal and vegetable matter, continually found lodged in ſtone; and as from the ſtructure of theſe ſtones, the diſpoſition of their veins, and all other obſervations relating to them, there can be no remaining doubt of their having once been fluid; it appears to me more wonderful, that there are not many more of theſe extraneous bodies found lodged in them, than that there are the few there are.

2. *Achates Sanguineus Variegatus.*
Hæmachates Antiquorum.
Variegated Blood-coloured Agate.
The Hæmachates or blood Agate of the antients.

This is another of the ſpecies of Agate, excellently charactered in the name the antients have given it, and more beautiful than moſt of this claſs. It is of a fine, even, cloſe, and compact texture, of a ſmooth, equal, and regular ſurface, generally of a roundiſh ſhape, and in ſize from two to four inches in diameter. It is of a very elegant, but always a ſtrong and deep red, like that of blood; often it is equally and uniformly ſo throughout the maſs, but more frequently is beautifully variegated with a pale blue, and with brown; the blue, in this caſe, always ſurrounding the red, and giving it a much greater right to the appellation of blood-coloured, as it very exactly and elegantly reſembles the ſerum, that ſeparates from and floats about the blood, when it has ſtood ſome time out of the body; this is a fine, thin, watery, or wheyiſh colour, and without more blue than the Chalcedony, and is never ſeen in any other part of the ſtone, only juſt about the edges of the red ſpots; the brown is the common horn-colour of the ground of many of the Agates, only ſomething darker than in moſt; this generally is ſeen running in irregular veins, but ſuch is the endleſs variety in the ſpecies of theſe ſtones, that inſtances of this are not unfrequent, in which this brown or horn colour is in the greateſt quantity, and properly the ground of the ſtone; and the red, with its blue edges, only the variegation; and even in this ſtate the ſtone is very elegant, the red parts looking no otherwiſe than like ſo many veins or clods of blood, with its ſerum about it, thrown into a maſs of other matter. It breaks with a fine, ſmooth, and even ſurface, and is very hard, and capable of an elegant poliſh. Its degree of tranſparence is very different in its different parts, and conſequently in the whole maſs, as it is compoſed of more or leſs of each; the red is conſiderably opake, the bluiſh white much leſs ſo; and the brown, though a deep colour, leaſt of all; beſide theſe, it is not unfrequent to ſee in ſome maſſes of this ſpecies veins or ſpots of a fair white, perfectly different from the bluiſh circles that ſurround the red parts; and of a yellow, much reſembling the Cerachates before deſcribed, but paler, but theſe are accidental and uncertain varieties; and indeed, I know very few ſpecies of the Agate, that may not at one time or other be found to contain veins of another.

It very freely gives fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It burns to a mottled dusky brown.

Examined by the microſcope, it makes a very beautiful appearance; a multitude of irregular ſpecks are, by this means, diſcovered in it, which eſcaped the naked eye, and which are very tranſparent, and exactly the ſame with the plainer white and brown Agates. The different degree of tranſparence in the different parts of the ſtone, afford a pleaſing variety, and the red parts with their edges, when viewed in a proper light, appear extreamly beautiful, not ill reſembling ſo many painted ſpots or lines from their ſhadows. From the obſervation of the ſpecks of plain Agate in this, and the larger and more conſpicuous parcels of it, in moſt other of the variegated ſpecies, it is eaſy to conclude, that the ground of the Agates is the ſame in all the ſpecies; that a cryſtalline matter, with a certain proportion of earth, pretty nearly the ſame in all, is the baſis of every one of them; and that their colours are all owing to the ſame cauſe, though made by different ſubſtances, and are in reality no other than parcels of more opake-coloured matter of the ſame kind; though differing in degree of purity, being of cryſtal, alſo debaſed by a larger admixture of coloured earths, which have fallen in among the matter of the Agate, while more or leſs ſoft, and accordingly have more or leſs regularly and intimately become blended with it, and either formed one equally-coloured maſs, or a veined or clouded one.

This ſpecies is not common any where; we have had ſome ſpecimens of it from America, and a few from the Eaſt-Indies. Germany affords alſo ſome ſpecimens of it, and thoſe leſs inferior to the American or Oriental, than is uſually the caſe in the ſame ſpecies of ſtone from thoſe different places.

Our Lapidaries eſteem it a very valuable Agate, and cut it when it can be had, into tops of ſnuff-boxes, and other toys, which ſell at a conſiderable price.

3. *Achates carneus punctatus & nebuloſus.*
Sardachates Antiquorum.
Clouded and ſpotted fleſh-coloured Achate.
The Sardachates or Carnelian Agate of the antients.

This is another of the Agates, excellently charactered by the Antients; and which, as it ſhewed extreamly plainly the nature of the matter it was variegated with, to be true Carnelian, they did not name from its colour, but from that ſubſtance.

It is a very elegant and beautiful ſpecies, of an extreamly fine, cloſe, and compact texture, of a ſmooth, even ſurface, and often of conſiderable ſize; ſome pieces having been ſeen of it of ten or more inches in diameter, but generally in the large maſſes. It is full of flaws and cracks, which render them much leſs valuable than the ſmaller; its ſhape is generally roundiſh or oblong, and almoſt conſtantly a little flatted: its ſtructure is very plain and ſimple; it having no veins, or other variegations, except thoſe made by an almoſt infinite aſſemblage of extreamly minute ſpots. Its ground is very pale or whitiſh, and theſe ſpots of a beautiful red, exactly that of the fineſt Carnelian. They are very variouſly diſpoſed in the different parts of the maſs; in ſome places they are only irregularly ſhewed in ſmall numbers, in others more thick, and frequent; and in many, in ſmall cluſters or congeries, reſembling little clouds; and in theſe, they are generally ſo numerous, or frequent, as to make a ſtrong red; it breaks with a fine, even, and gloſſy ſurface, and is conſiderably hard, and capable of an elegant poliſh. It is differently tranſparent in the different parts, but in general is more ſo than moſt of the clouded Agates.

It very freely gives fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a higher, but more opake and dusky red.

Examin'd by the Microſcope, its ſpots are every where diſcovered to be of a figure approaching to round, of very determinate edges, generally quite ſeparate from one another, and of a ſmooth texture and compactneſs, that evidently ſhews them to be not as many of the variegations of the Agates, particularly of the European kinds, are, plain-colour'd Earths, but the true matter of the Carnelian.

It is produced in the Eaſt and Weſt-Indies, and ſometimes is found, tho' leſs beautiful, in Bohemia, Sileſia, and ſome other parts of Europe.

Our Lapidaries don't much eſteem it; but in Germany, and ſome other places, ſmall vaſes, &c. made of it, are in great repute.

4. *Achates miniaceus flavo variegatus.*
Coralo-achates antiquorum.
The red lead-coloured Agate, variegated with yellow.
The Coral Agate of the Antients.

This is another of the Agates of the antients, which by the ſpecimens we ſee of it, was plainly not ill character'd by the name they gave it. It is truly of the minium or red-lead colour; but whoever has ſeen the ordinary red Coral rough, and as taken up out of the ſea, will be ſenſible that its colour much approaches to red-lead, except in brightneſs. The livelineſs of this colour is indeed very ſingular in a ſtone of this claſs; but tho' the name the antients gave it did not perfectly expreſs that, it very well diſtinguiſhed it from all the other Agates. They knew three red ones, a deeper and a paler, and this; the firſt they called the blood-colour'd, the pale one the Carnelian-Agate, and this, which was of a middle-red, they diſtinguiſhed by the colour of another ſubſtance, of a middle degree of colour between the others.

It is a very elegant ſpecies, of a fine, pure and equal texture, of a ſmooth and regular ſurface, generally of a roundiſh or pebble-like form, and ſeldom, though ſometimes, broad and flat. It is of various ſizes, from one inch to four or five in diameter; and is ever of a very regular ſtructure. Its baſis being a paler red, in which a deeper is diſpoſed in concentric veins round one, two or more points. At a ſmall diſtance, this is not diſtinguiſhable; but cloſely examined, few ſpecimens are without this ſtructure: Some indeed I have ſeen, where the two ſubſtances have been diffuſed into one equally-colour'd maſs: but thoſe inſtances are rare. This is ever, beſide theſe veins, variegated with ſmall irregular blotches of a fair bright yellow; they are ranged with great irregularity in the maſs, but never interſect or are interſected by the veins; they are always lodged either within or without-ſide of the veins, in the plain ſubſtance of the maſs, or elſe they fall longitudinally between them in ſmall oblong ſpots; it is ſingular in this ſpecies that the ſpots are all ſmall, and generally either pretty regularly round or oblong; they are of a very bright colour, and I never ſaw any of them of more than $\frac{1}{6}$ of an inch in length, or the half of that in diameter. It breaks with a fine, even, gloſſy ſurface; and is very hard, and takes an elegant poliſh.

It gives fire freely with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a redneſs, even in the yellow ſpots.

Examined by the Microſcope, the ſpots appear of the true matter of the yellow Carnelian, but the body of the Agate of a very different ſtructure from the red one. The paler parts are more tranſparent than the veins, tho' no part of the ſtone is very greatly ſo.

We have it from the Eaſt-Indies, but not in any degree of plenty. We have in this ſtone one of the many inſtances of the greatly ſuperior value of the deſcriptions of the antients, to thoſe of the later writers. Pliny's deſcription of this ſtone is, tho' very ſhort, yet determinate, juſt, and particular. He ſays it was *Guttis aureis Sapphiri modo ſparſa.* I have in another place obſerved, that their Sapphire was of the *lapis lazuli* kind, but had the yellow matter in diſtinct ſpots, not in veins. This ſtone has its yellow exactly in the ſame manner, and by this ſhort character was evidently diſtinguiſh'd from all the other Agates, ſince none other of them had it regularly ſo. But the Authors who wrote after him, tho' they kept to the red and yellow colour of the ſtone, have yet quite confuſed and miſled their readers, by not regarding their diſpoſition, but telling us that the Coral-Agate was red veined with yellow. Marbodæus has reduced their ſentiments into verſe, and tells us, ſpeaking of the Agate,

Hunc quoque Corallo ſimilem gerit inſula creta
Cujus planities croceis eſt illita venis.

The plain truth ſeems to be, that the old Authors ſaw or laid before them the things they deſcribed; and therefore their characters, tho' ſhort, were ever juſt; and as they had judgment to ſelect the moſt remarkable, they were always expreſſive alſo. Thoſe who followed them, ſeem to have been mere plagiaries, and, as they had no knowledge of the things they wrote about, often by their manner of repeating their words, altered their ſenſe. A man who knew nothing of the hiſtory of the Agates, or other ſuch ſtones in general, if he read that one was red and yellow, might eaſily conceive it was all one, whether it were veined or ſpotted; but a Naturaliſt, who had examined the whole claſs, would be very fond of finding ſo remarkable a particular as its always having its variegation in the train of ſpots, recorded by an antient Author, juſt as he found it yet in the ſtone.

SECT. III. AGATES, with a yellowiſh Ground.

1. *Achates flaveſcens.*
Cerachates antiquorum.
Yellow Agate.
The Cerachates, or wax-colour'd Agate of the antients.

THIS is a very ſingular ſpecies of Agate, and one of thoſe which the antients have ſo excellently named, that no other word could have ſerved alone ſo ſtrongly for a deſcription of them as the compound name they have choſen to expreſs them by.

It is of a very elegant, fine and even ſtructure, extreamly compact and firm, of a rugged, unequal ſurface, and very various in ſhape and ſize. I have ſeen of it from one to ſeven inches in diameter, and many ſpecimens of it broad and flat, tho' the greater number are irregularly protuberant, and formed much like our ordinary Flints. It is ſometimes of one pure and equal ſtructure, without veins, ſpots, or any other variegations, ſometimes irregularly made up of veins, and at others of a pale and almoſt white ground, clouded and veined with its natural colour, which is a ſtrong yellow, and that ſo exactly reſembling that of the finer yellow wax, that it is not eaſy, at a yard's diſtance, to diſtinguiſh a rough piece of it from a like piece of that ſubſtance. The reaſon of its various appearance is, as I hinted in regard to the former ſpecies, the different diſtribution of the matter of its variegation: the various ſpecimens I have ſeen of this have convinced me that its ground or baſis is a cryſtal debaſed by a ſmall admixture of Earth, like the other Agates, but that it has been ſubject to receive a large admixture of this yellow Earth beſide; this, if it fell into the maſs when pretty far concreted, is ſeen in it in opake, looſe clouds or ſpots; if when ſomething ſofter, it has run into thinner and more regular veins; and if this yellow matter, while both itſelf and the matter of the Agate it mixed with were perfectly ſoft, became mixed, and a little agitated by the motion of the fluid it was formed in, it has blended and diffuſed itſelf perfectly among it, and made one ſimple maſs. Theſe are the three ſtates we find this and ſome other of the Agates at times in, and this ſeems very evidently the hiſtory of their origin. This breaks with a very ſmooth and gloſſy ſurface, and is very hard, and capable of an elegant poliſh, but according to the quantity and diſpoſition of its yellow matter, is very different in its degree of tranſparency, ſometimes equaling in this almoſt any of the Agates, at others being altogether or in great part almoſt abſolutely opake.

It very readily gives fire with ſteel.

It makes no efferveſcence with Aqua Fortis.

It burns to a pale red.

Examined by the microſcope, it appears a very elegantly variegated maſs; the whiter parts, where there are any of them, appear little different from the common Agates, and the yellow are ſeen very beautifully variegated according to the courſe of the yellow matter: I never obſerved it in ſpots, as is common in the red, before deſcribed, but ever either equally diffuſed, or in undulated lines.

It is found in many parts of the Eaſt-Indies, as alſo in New Spain, and ſome other parts of America. There is of it alſo in Germany, but much inferior to the others. Our Jewellers ſet no value on it; but in other places it is work'd into knife-hafts, handles for hangers, little images, and other toys.

2. *Achates pallide flaveſcens albo nigro & viridi eleganter variegatus.*

Achates Leonteſeres & Leonina antiquorum.

Pale yellow Agate variegated with white, black and green.

The Lion Agate of the antients.

This was the moſt eſteemed among the antients of all the Agates, and that not only for its beauty, but for its ſuppoſed virtues in charming the fury of wild beaſts. I would have willingly imagined, that as its colour in the ground, or common matter, is a pale yellow, they had given it its name of Lion Agate, from its reſemblance to the ſkin of that beaſt in colour; but the oldeſt Authors agreeing to call it, not Leonina, but Leonteſeres, the Lion-tamer; and Orpheus declaring it to be ſo called from its virtues in charming the rage of lions, we cannot rank it among the number of thoſe they have character'd ſo juſtly in their names.

It is the moſt variegated of all the Agates, and is in truth a very elegant and valuable ſtone. I had long looked upon the deſcription Orpheus gives of it as mere imagination, but have ſince had an opportunity of finding he did the ſpecies no more than juſtice in allowing it, what we find it to poſſeſs to this day, a yellow ground, with very often flame-colour'd variegations, and never without ſome of all his other colours, white, black, and green. His deſcription is,

Εἶδος ἔχοντα δαφοινὸν ἀμαιμακέτοιο λέοντος

And afterwards,

Κατάστικτος σπιλάδεσσι
Πυρσαῖσιν, λευκαῖς τε, μελαινομέναις χλοεραῖς τε.

In ſome of the old editions of this Poet, what is here λεοντος, is given δρακοντος, and Salmaſius has given a quotation of this very paſſage, p. 95. with that word. In a former treatiſe on theſe ſubjects *, I gave it in the ſame manner, having then never ſeen the ſtone, but am now ſatisfied that the true reading is λέοντας, becauſe the reſt of the deſcription agrees well with the ſtone, as we find it to this day, and the ground of it is truly of the colour of the lions ſkin. Thus old Authors often explain facts, and facts often explain and ſet us right about them. We are at preſent apt too lightly to eſteem them; but this is one of a thouſand ſimilar inſtances, in which they have given us more correct and accurate deſcriptions of the ſtones they treat of, than any we can find in the works of thoſe who have written ſince.

This is of an extreamly fine, compact and cloſe texture, of a rough, rugged and unequal ſurface, very irregular in ſhape, and often running out into protuberances in various parts, like our common flints. It ſeems generally large; the ſpecimens I have met with of it having been of four or five inches diameter, or fragments of ſuch maſſes. Its ſtructure is very various and uncertain, like that of moſt other of the variegated ſtones of this kind: ſometimes it is one irregular congeries of all theſe colours; at others more diſtinctly clouded with them, and ſometimes has the black and green in regular veins, made up of concentric circles, round a certain point; but all irregular. Its ground is the only fixed thing in its compoſition; that is ever of a pale-yellow; but it is very differently diſpoſed in the different ſpecimens, in ſome making up the greateſt part of the maſs, in others but a very ſmall one. Sometimes one and ſometimes another of the other colours are wanting in the particular ſpecimens, but in many they are all found; the white is much like that of the white veins of the Onyx, very bright and beautiful; the red, or flame-colour, for that is properly its denomination, is a mixture of the yellow of the ground, a pale Carnelian-colour; the green is properly and perfectly that of the Jaſper; and the black, tho' it appear very deep on a curſory view, if nicely examined, is ever found to have ſomething of brown in it, and to be much the ſame with the black or blackiſh-brown veins of the deep brown Agate, before deſcribed: what gives a great value to the ſtone is, that all theſe variegating matters are very nearly of the ſame fine texture, and ſame hardneſs, ſo that the ſtone is capable of a perfect and equal poliſh. It breaks difficultly, but with a fine, ſmooth and gloſſy ſurface.

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* Commentaries on Theophraſtus.

It freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a mottled grey.

Examined by the Microſcope, it appears very bright and beautiful, and equally ſo in all its parts: the green, of all the other colours, is the moſt opake, tho' no part of the whole has much tranſparence.

It is brought only from the Eaſt-Indies, and not much known among our Lapidaries, I ſuppoſe, from its being ſcarce; for, were it to be had in quantities, its beauty muſt make it very valuable.

SECT. IV. AGATE, with a brown Ground.

I. *Achates fuſcus venis & maculis fuſco nigreſcentibus.* *The blackiſh-vein'd brown Agate.*

THIS is a very valuable and elegant ſpecies. It is of a particularly fine, equal and ſmooth texture, and very firm and compact, of a tolerably ſmooth and even ſurface, very irregular in ſhape, but generally ſomewhat rudely approaching to round, and from two to ſix or ſeven inches in diameter. It is of an extreamly beautiful, and generally pretty deep brown, and is elegantly clouded, ſpotted and vein'd with a deep and almoſt black variegation: the veins are in general paler and browner than the reſt of the variegation, and the ſpots and clouds often very near black; the veins are generally depoſed in irregular concentric circles, as in the other two ſpecies before deſcribed, and are generally broadeſt in their inner, and narrower in their outer ranges, or thoſe which moſt approach toward the ſurface of the ſtone. The clouds and ſpots ſometimes run into figures of the Dendrites kind, but this is more rare; they are generally very irregularly and uncertainly diſpoſed, and may be conſtrued into a thouſand reſemblances by a ſprightly imagination. Tho' moſt of theſe, however, are merely imaginary repreſentations, in this ſpecies I have, at times, found real parts of plants embodied, and that ſo unqueſtionably certain, that I have, on breaking the ſtone, taken out the piece, and diſcovered in it the very lineaments of the cortical part of the plant. The vegetable matter thus encloſed is generally either of the ſlender roots of moſs, or of the tender confervæ. I have indeed a ſpecimen of it with the perfect leaf, ſtalk and root of a ſmall water-plant, of the lens paluſtris kind; but theſe things are very rare. The ſtone breaks with a fine, ſmooth, gloſſy ſurface, and is extreamly hard, and capable of a very high and elegant poliſh.

It readily gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a duſky grey.

Examined by the Microſcope, it appears extreamly pure, bright and pellucid; its veins and clouds are more opake than the reſt.

Our Lapidaries are very fond of, and cut it into ſeals, buttons, heads of canes, handles of knives, tops of ſnuff-boxes, and other ſuch things. This they have found the way alſo to execute a very elegant kind of workmanſhip on in Germany, and of late in England. They draw the lines of any figure they would repreſent on it, and afterwards ſink their colour, with which they expreſs them ſo deeply into the body of the ſtone, that the ſurface may be poliſh'd after the work is done; and the whole make much the appearance of the natural veins in the ſtone. The method of doing this is at preſent a great ſecret, and the things bear a great price. Other Agates will all indifferently bear it, but the cloſe texture and even ſtructure of this ſpecies makes their lines ſtand more determinate and true, and the extreamly fine poliſh it is capable of after the work is done, makes it much preferable to all others. Where this is not to be had, the white Agate, firſt deſcribed, is generally choſen, and ſometimes the coarſer German kind; but that is too poor for the price the pieces are valued at.

The inventor of this ſecret in Germany is not known, but he has left ſome laſting teſtimonies of his art in the cabinets of ſome of the German Princes, tho' he never declared himſelf to be poſſeſſed of it. There are ſome Agates there of great beauty, of his figuring, particularly one with a raven, and another with a ſtag, both ſo perfectly and elegantly expreſſed on them, that no one could have believed them natural, but that they were found really not on the ſurface, but in the body of the ſtones; and it was not then imagined art could place them there. We have now in England a gentleman who gives elegant portraits, in the ſame manner. And, as it is pretty plain that the art has been once before known, and loſt again, till recover'd by this gentleman, I would fain believe that it was known much earlier than has yet been gueſſed. I would never, but of neceſſity, diſbelieve the antients, and ſhall always think myſelf very happy in reſtoring their credit. By this ſuppoſition, that this elegant art was one of the many they were poſſeſſed of, which have not come down to us, we may be brought to believe they have not impoſed deſignedly on us, but were themſelves impoſed on in ſome things they have recorded to us of the Agates, particularly of that of Pyrrhus's, which authors tell us, had beautifully delineated in it Apollo, with his harp in his hand, and the nine Muſes about him, with each her proper ſymbols. There are many ſtrange ſtories handed down to us of the figures of Agates, but this is certainly the moſt extraordinary; and tho' we can never be brought to allow that it is probable nature ſhould have marked a ſtone in that manner, yet, if we ſuppoſe only that ſome cunning artificer had the ſecret of ſtaining now known, and the addreſs of the late German to keep it a ſecret that he had it, the good king himſelf might be led into the error of thinking it naturally there, as he could have no idea of that art, by which it was ſunk thither. This may have been the true hiſtory, very probably, of this and the other wonderfully-figur'd Agates we read of; and the ſight of one of theſe, with the memory of the accounts of others, incited, I ſuppoſe, the good old Marbodæus to give the figures of kings and deities, as part of the character of this ſtone, and firmly believe all that he had heard of ſuch things being naturally there. His deſcription of it is,

Hic lapis ingenitas memoratur habere figuras
Cujus nativis facies interlita Venis
Nunc regum formas, nunc dat ſimulacra Deorum.
Rex Pyrrhus digito geſſiſſe refertur Achatem
Cujus plana novem ſignabat pagana muſas,
Et ſtans in medio Cytharam tangebat Apollo
Naturæ, non artis opus mirabile dictu.

Sect. V. AGATE, with a greeniſh Ground.

1. *Achates fuſcovirens Variegatus.*
Jaſpachates Antiquorum.
Greeniſh brown Variegated Agate.
The Jaſp-Agate of the Antients.

THIS is another of the Agates of the antients, as properly as any of the former, charactered by thoſe fathers of natural hiſtory, being truly a compoſition of Agate and the genuine matter of the Jaſper. It is a very beautiful ſpecies, of a fine, elegant, ſmooth ſubſtance, and cloſe, compact, and firm texture; it is of a ſmooth, equal ſurface, generally approaching to a round figure, and appearing as if worn and rounded by the motion of waters, and is found in maſſes of from two to five, or ſometimes ſix inches in diameter. Its ſtructure is extreamly uncertain and irregular; ſometimes it is one equally coloured maſs, without cloud, ſpeck or vein, and only diſtinguiſhable from the green Jaſpers by its ſuperior hardneſs and brightneſs; this, however, is but ſeldom the caſe: it more frequently is of a browniſh green ground, variegated with irregularly concentric circles, of a red, or of a finer green, but moſt uſually is found with this greeniſh brown ground, irregularly clouded and ſpotted with thoſe and ſome other colours, white, fleſh-colour, and yellow, not unfrequently making part of its variegations. It breaks with a fine ſmooth gloſſy ſurface, and is very hard, and capable of an elegant poliſh. It is differently tranſparent in its various parts, and but obſcurely ſo, even in the cleareſt of them.

It very freely gives fire with ſteel.

It will not ferment at all with Aqua Fortis.

It burns to a grey and red variegated maſs.

Examined by the microſcope, it appears a confuſed maſs, but in all parts very bright and ſhining, and nearly of an equal texture and purity in all; for this reaſon alſo, it takes a more equal poliſh than almoſt any other of the variegated kinds.

It is very plentiful in the Eaſt and Weſt-Indies, as alſo in Sileſia and many parts of Germany; there is, however, a great difference in the purity of the European and Indian ſpecimens, which ariſes from the proportion of the earthy and cryſtalline matter that make the variegations. In theſe, as in all the other pebbly and flinty ſtones, there is a greater admixture of earth in the European, and conſequently they are coarſer, ſofter, and more opake than the Oriental or American. And theſe being leſs debaſed by earth, approach more to the nature, and have more of the qualities of pure cryſtal. As cryſtal, however, is the ſame in all, and as the earth is the ſame that makes theſe variegations in cryſtal in the ſame ſtones, the ſpecies is evidently one and the ſame, though in different degrees of purity; and the German ſtone compoſed of the ſame cryſtal and the ſame earth with the Oriental, is not to be made a different ſpecies by the judicious naturaliſt, becauſe the proportion of this mixture is different, any more than that every ſpecimen by the proportion varied more or leſs in every one, even of the ſtones of the ſame ſpecies, and ſame place, is to be accounted a different ſpecies, becauſe a little finer or a little coarſer.

As the plain ſtones of Europe, and the Eaſt or Weſt-Indies, are therefore, in the judgment of the able naturaliſt, the ſame ſpecies, though very different in fineneſs, tranſparence, hardneſs, &c. while compoſed of the ſame principles, ſo are alſo the coloured ones; and this Jaſp Agate, which has both its ground and its variegations coarſer in Germany than in the iſland of Borneo, or New Spain, does not ceaſe to be the ſame ſpecies, while its ground is compoſed of the ſame cryſtal, and ſame earth, with that of the ſame ſpecies in thoſe places; and its variegations, which in the Eaſt-Indies are true oriental Jaſper in Europe, are of as true European Jaſper.

The coarſeneſs of the variegating matter in German Agates, not only of this, but of many other ſpecies, makes it ſo opake in the maſs, as to appear like an extraneous ſubſtance, and not naturally a part of it; and fertile imaginations, hence, have not only formed it into the figures of woods, towns, and rivers, but even led themſelves to fancy its narrow ſtreaks, the ſtalks of ſmall vegetables, or filaments of the conforvæ of the freſh waters; cloſe obſervation will, however, always ſhew the error of this, and ſtamp a real and laſting value on thoſe few ſpecimens, which are found really to contain ſuch ſubſtances, as it has been obſerved they ſometimes do, and it is wonderful that they do not much oftener.

Our Lapidaries eſteem the oriental ſtones of this ſpecies very valuable, and work them into many ſorts of toys; they eaſily diſtinguiſh the German, and account them of little value. I have been told, indeed, of ſome German pieces, that were undiſtinguiſhable from the oriental; and ſome authors have mentioned ſuch; but by all I have been able to learn from obſervation, they muſt either have been very ill judges who could not diſtinguiſh them, or the opinion of their being German muſt have been eroneous.

SERIES III.

CLASS II. ORDER II. GENUS II.

ONYCHES.

Semipellucid Gems, with various coloured zones, but no red ones: formed of cryſtal, debaſed by but a very ſmall admixture of earth; and compoſed either of a number of flat plates, or of a ſeries of coats made by incruſtation round a central nucleus; the different coloured ones being covered with a coat of the common matter of the ſtone, and ſeparated from one another by, and alternately variegated with thin veins of that matter in form of other zones.

AS there have ever been diſputes about moſt of the Gems of the antients, the Onyx has not been leſs perplexed with them than the reſt; the character now given will probably however ſerve for the more perfect diſtinction of them, from other ſtones, for the future: where they can be ſeen in the rough maſs it cannot fail an accurate obſerver, but where only ſmall pieces are ſeen, cut, and poliſhed, there requires great care and attention to diſtinguiſh with certainty. Our Lapidaries ſeem to have intended the baniſhing the diſtinction of Onyxes and Agates out of the world; for as the zones are the great and moſt obvious character of this Genus, they have found a very eaſy way to make pieces of the Agates properly cut reſemble them. The Agate, though never plated or formed in regular zones, is frequently veined in ſtrait narrow lines; and a piece of one of theſe Agates cut perpendicularly to the ſite of thoſe veins, gives the very figure of the zones of an Onyx: the white Agate of Gambay is what they uſually choſe for this purpoſe; ſuch pieces of this ſtone as have the black dendritæ in them are their Mocho ſtones, and ſuch parts of the maſs as have not theſe, and have theſe cloſe ſtrait veins, it is a common deceit to cut as Onyxes. As the texture of the true Onyx, and this ſtone, are however different, the different degree of purity and tranſparence will be always a rule to diſtinguiſh theſe by. The oriental pale Onyxes, firſt to be deſcribed, which are the kind theſe reſemble, have ever ſomething of a bluiſhneſs which theſe want; and their veins are of a better white; theſe are alſo leſs regularly diſpoſed, and as the ſtone is leſs coarſe and more tranſparent, they are alſo more tranſparent, and have ever inſtead of a bluiſhneſs, ſomewhat tending toward a dead white look. This is the diſtinction of this Onyx from the niceſt of the modern counterfeits. The confuſion between the Alabaſter and this Gem, ſo frequent in almoſt all the writers on Foſſils, will be hereafter taken notice of in the deſcription of that ſtone among the marbles.

1. *Onyx albido-ſubcærulea, zonis albidis & fuſcis*
Onyx legitima Antiquorum.
The bluiſh white Onyx, with brown and white zones
The true Onyx of the antients.

This is a very elegant and beautiful Gem; and among the many ſtones, diſtinguiſhed among the antients by the name of Onyxes, this ſeems to have been of all the moſt ſtrictly, and properly ſo called, and indeed to have been the teſt and ſtandard of the reſt, which only were called by the ſame name, as they were of the ſame texture and ſtructure with this. It is evidently the Onyx τὸ ὀνύχιον. Theophraſt. Ed. N. p. 84. and may be properly called the genuine Onyx of Pliny, v. 2. p. 778. Salmaſ. in Solin. 396. Cæſalpin. 121. Aldrov. Muſ. 915. Boet. 244, and De Laet. 62.

It is of a very fine, cloſe, compact, and firm texture, of an irregular and uneven ſurface, very indeterminate in figure, being often flat, and not leſs frequently of a ſhape approaching to round, and often perfectly rude and irregular; its general ſize is from one to three inches in diameter, and its ſtructure ever, either tabulated or cruſtated; thoſe pieces of it that are flat are always compoſed of a multitude of thin plates, laid even and regularly one on another, and thoſe which are roundiſh, or in the ſhape of pebbles, of a great number of even and regular cruſts of different colours, ſome white, ſome brown, and others of a bluiſh caſt, like the Chalcedony; all regularly and evenly diſpoſed round a central nucleus, which is commonly of pure cryſtal, and moſt uſually of an angular form; the conſequence of which is, that the different plates which make the zones are exactly of the ſame figure. The plates of the flat ſpecimens are exactly of the ſame colours and texture with theſe, and the bluiſh part of both may properly enough be called the baſis: it being never diſpoſed in regular veins, but generally appearing very plainly to be the maſs, receiving the zones of brown and white. It has never any other veins than theſe, nor are any of theſe ever diſpoſed otherwiſe than with this great regularity.

It breaks with a fine, even, ſmooth ſurface, and is very bright and moderately tranſparent.

It is of very conſiderable hardneſs, and capable of an elegant poliſh.

It very freely gives fire with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It burns to a duſky white.

Examined by the Microſcope, it appears evidently compoſed of three perfectly different ſubſtances. though all are, in reality, of the ſame cryſtalline matter, varied only as it is differently debaſed by earth. The ground or baſis of the ſtone ſeems evidently the ſame ſubſtance with the ordinary Chalcedony, only that the earthy matter in this is not in form of a cloud, or in a diſcontinued congeries of moleculæ, but is regularly mixed through the whole quantity; the brown zones are evidently of a cryſtalline matter debaſed by a ſomewhat greater admixture of a brown earth; and the white, though very beautiful, are in reality the fouleſt and moſt debaſed of all; theſe laſt are the moſt opake part of the maſs as the baſis is the leaſt ſo. The central nucleus is ſeldom an even or well concreted cryſtal, but generally looks as if cracked and ſhattered, and loſes much of its tranſparency by that; a white zone generally immediately ſurrounds this, after that one of the matter of the baſis, then generally a brown one, and ſo on with a good deal of regularity, for a conſiderable number, over all which there is finally a thick covering of the matter of the baſis of the ſtone.

This is very common in many parts of the Eaſt-Indies, and is found alſo in New Spain, and ſometimes in Germany and Italy, though of leſs beauty and tranſparence than that from the Eaſt-Indies. Agricola, L. 6. de nat. foſſ. ſays, they are alſo found in the mountains of Tuſcany, but does not tell us they are of the beauty of the oriental.

Our Lapidaries are fond of diſtinguiſhing the oriental from the German onyxes, but they are ſo uſed to their counterfeits of the oriental, with properpieces of the white Agate before-mentioned, that moſt of them forget that it is a counterfeit, and have taught themſelves to think, that there is no difference between that ſtone and the real Onyx, or more determinately ſpeaking, that there is no oriental Onyx at all. It is cut into toys of all kinds that its ſize will permit, ſeals, buttons, counters for card-playing, ſmall vaſes, and handles for what they call deſert knives are frequently made of it.

2. *Onyx puriſſima Zonis Niveis.*

The pure Onyx with ſnow-white veins.

This is the pureſt, cleareſt, and brighteſt of all the Onyxes, and though compoſed only of two colours, is inferior to very few in beauty.

It is of a moſt perfectly ſmooth, compact, and even texture, of a tolerably equal and regular ſurface, and ever found in form of a roundiſh pebble; its ſize is from half an inch to four inches in diameter. Its ſtructure is like that of the former; it has a large nucleus of pure cryſtal, but, like that, commonly looking as if cracked or ſhattered, and ſurrounded with a number of regular zones, and thoſe only of one colour, beſide the common matter of the ſtone; this is a moſt pure and elegant white. The common matter or baſis of the ſtone is of an extreamly ſmall admixture of the bluiſhneſs of the Chalcedony, only regularly diſtributed among a maſs of pure cryſtal; this alone debaſes it from the true ſplendor and tranſparence of cryſtal, which it much emulates, and a zone of this is regularly diſpoſed between every two of the white, and makes alternate ſtreaks of white and bluiſh; theſe ſurround the nucleus in great order, and regularity, and are generally thickeſt or broadeſt toward it, and grow narrow as they approach the ſurface of the ſtone, till becoming extreamly thin and faint, they almoſt loſe themſelves in the matter of the maſs; and are ever ſurrounded by a thick coat of that, abſolutely without variegation. The cloſe application of the innermoſt of theſe zones to the ſhape of the nucleus, which is generally angular, and that of all the ſucceeding ones to that, gives a very beautiful regularity to the whole, and is a moſt plain proof of the nature and origin of the ſtone; for it is moſt evident by them, that the cryſtalline nucleus firſt concreted in the once univerſal fluid, and that afterwards matter of two different kinds became applied to it in ſmall quantities, and by the motion of that fluid was regularly and evenly ſpread over it, and formed the cruſts or plates which now make what we call its zones. It breaks with a very regular and beautiful flinty ſurface; is very bright, and more tranſparent than almoſt any other of this Genus, of great hardneſs, and capable of a beautiful poliſh.

It very freely gives fire with ſteel.

It makes no efferveſcence with Aqua Fortis.

It burns to a pure white.

Examined by the Microſcope, the zones appear of a very beautiful, even texture, of a perfectly ſnowy whiteneſs, and conſiderably opake. They are frequently alſo ſeen ſpotted all over with extreamly minute dots of a fine red, which make a very elegant appearance, in this way of viewing, tho' they entirely eſcape the unaſſiſted eye. It is an admixture of the true matter of the Carnelian that gives theſe beautiful ſpots, and this ſpecies of the Onyx is ſo far ſubject to it, as to have them, in ſome ſpecimens, diſtinguiſhable by the naked eye. I have a ſpecimen of it, the inner zone of which that immediately ſurrounds the nucleus, is $\frac{1}{12}$ of an inch broad, and finely variegated with an undulated row of theſe ſpots, large enough to be plainly diſtinguiſhable to the naked eye, and of a very fine red; but ſuch are not common. A very ſlight admixture of this matter of the Carnelian is an accident not uncommon to this ſpecies; and where it is not in ſpots large enough to be ſeen by the naked eye, often gives ſomewhat of a glow of fleſh-colour to it; and the zones, tho' of the pureſt white imaginable, if held up againſt the light, in a thin poliſh'd plate of it, and viewed either with or without the microſcope, appear of a fine pale-brown.

This is found in many parts of the Eaſt-Indies, and in no other part of the world, as far as is yet known. The Italians diſtinguiſh it by the name of the Oriental Onyx, without addition, charactering all the other ſpecies according to their colours; they make ſeals, ſmall vaſes, and other toys, of it. We have it pretty frequently brought into England, but don't eſteem it ſo much as it deſerves.

3. *Onyx puriſſima cornea Zonis læte virentibus.*
Quæ Jaſponyx antiquorum.
The Jaſponyx of the antients,
Or Horney Onyx with green Zones.

This is a very rare and valuable ſpecies, and ſecond to none in beauty. It is the *Onyx in qua corlor Jaſpidis ſudinis apud Plinium. Jaſponyx de Boet* 244. *De laet* 64. *& aliorum.*

It is of an extreamly fine, cloſe, compact and even texture, and of a very ſmooth and regular ſurface; it ſeldom exceeds two inches in diameter, and is rarely perfect, if leſs than one inch thick. Its ſhape is ever approaching to round, and ſomething like that of the pebbles. It has always for its baſis a large central nucleus of very pure but ſhattery and irregularly concreted cryſtal; this is variouſly figured, ſometimes oblong, ſometimes roundiſh, and often pointed in ſharp angles in many places; theſe, where they happen, are the occaſion of great beauty in the ſtone, for as the zones of all the angles are cloſely and regularly affixed round the nucleus and round one another, they ever take very exactly the figure of the nucleus, and where that is angular, are all equally ſo. The baſis or common matter of this ſpecies is a cryſtal very little debaſed by earth, very bright, and of a true horn colour. Its zones are of a beautiful green, often little inferior to that of the Oriental Emerald, and as pure and pellucid as the green Oriental Jaſper, of the very ſubſtance of which they truly are; that is, of Cryſtal debaſed by a very ſlight admixture of earth, and tinged with a fine green by copper. Theſe are generally the only zones in the ſtone, and are diſpoſed regularly round the cryſtalline nucleus, with alternate lines of the common matter of the maſs: at other times they are variouſly ſeparated by many zones of a pure white, and in this caſe make the ſtone even much more beautiful than when they are lodged alone in it; this green and white Jaſponyx being ever much more eſteemed than the green. A ſlight obſerver might be apt, from this admixture of white veins with the green, to conſtitute a new ſpecies of the ſtone; but a cloſe obſervation will determine theſe green and white veins to be more nearly ally'd to one another than might appear on a ſlight examination, ſince, if they are traced with the aſſiſtance of the Microſcope, they will be found to change into one another frequently, and to be indeed the very ſame ſubſtance, only that the green has that metalline tinge which is wanting in the white. There is ever over all theſe zones, which are of very different breadth in the different ſpecimens, a thick coat of the common matter of the maſs; ſo that the ſtone, when rough, does not make the leaſt ſhew of what it really is; and I believe many fine ones have been loſt by that means. It breaks with a moſt ſmooth and gloſſy ſurface, is very tranſparent, even in the zones, as well as the baſis, and takes a moſt elegant and high poliſh.

It very readily gives fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a pure white.

Examined by the Microſcope, it appears a moſt beautiful maſs; the ground is little inferior to pure Cryſtal, and the zones have many of them the beauty of the fineſt Jaſper. Theſe are not like thoſe of the Sardonyx, compoſed of a number of different looſe ſpots, but are green throughout, and as pure and equal in their colour and texture, as the fineſt of the ſtones they are of the nature of.

This is found very ſparingly in the Eaſt-Indies, and in New-Spain, and no where elſe, that I have certainly heard of. The Germans have a ſtone they call by this name, from Bohemia, but it is no other than an Agate, to be deſcribed hereafter. Our Jewellers value it much, and cut it into various toys, but it is ſcarce amongſt us. The German green-vein'd Agate has of late been introduced, in ſome places, among us, under its name; but this cannot deceive a judicious Naturaliſt, tho' it may thoſe whoſe intereſt it is to think better of it than it deſerves.

4. *Onyx fuſca, zonis albido-cœruleis.*
The brown Onyx with bluiſh-white veins.

This is a common ſtone in the Eaſt-Indies, but ſeldom ſeen among us; the many more beautiful ſpecies brought thence making our Lapidaries ſeldom think this worth working, tho', when well poliſh'd, it makes a very agreeable figure. It is of a very fine, compact and cloſe texture, of a tolerably ſmooth and regular ſurface, ever of a roundiſh or pebble-like ſhape, and in ſize from one to three inches in diameter. It has for its baſis a central nucleus of Cryſtal, which is generally very ſhattery and opake; this is of an uncertain figure, and is exactly ſurrounded by a multitude of narrow zones, one within another, all ranged alternately with extreamly narrow ones, of the common matter of the ſtone; this is a very ſlightly-debaſed Cryſtal, tinged to an agreeable brown, with particles of earth, but thoſe ſo ſmall in quantity, as to leave it very tranſparent, and ſo equally mixed as to be in no one part more viſible than in another. The zones, tho' very narrow, are very elegant; they are almoſt all of one determinate thickneſs, and are of a very elegant bluiſh white. It breaks with a fine, even ſurface, and is very hard, and capable of an elegant poliſh, and when wrought, is very bright and tranſparent.

It freely gives fire with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It burns to a duſky grey.

Examined by the Microſcope, the ground appears little inferior to Cryſtal. The veins are opake, but very beautiful in colour, and are for the moſt part diſtinguiſhable to be white in the middle, and growing bluer to' the edges, where they are always edged round with a thin line of the pale-blue of the Chalcedony.

It is very common on the ſurface of the earth, and in the beds and on the ſhores of rivers in every part of the Eaſt-Indies. It is alſo found in Germany, Italy and America, but in none of theſe places is ſo pure as in the Eaſt-Indies.

It is very plain that the origin of all theſe cruſtated Onyxes has been the ſame; a quantity of Cryſtal, debaſed by various admixtures of earth, and by that prevented from ſhooting into its own natural form, has been ſuſpended together in the once univerſal fluid; a nodule of this purer than the reſt, firſt concreting, as it is moſt natural that the moſt pure ſhould do, became every way ſurrounded by other matter, ſoon after concreting; which, if applied to the already formed nodule, only in one part, tho' there is no reaſon to doubt its being applied regularly at once in all, but, if only in one, while moiſt and in a fluid medium, in ſome degree of motion, it would not be ſuffered to remain in form of a rough protuberance there, but be ſpread by the motion of the water over the whole ſurface of the thing it lay on. It is natural enough to ſuppoſe theſe additions of new matter made in ſmall quantities, and hence the thinneſs of the zones in many of theſe ſtones; as their being, when ever ſo minute, yet continued round, and not broken, is owing to the extream fineneſs of the matter which they were compoſed of, which having no inequalities in its texture, was capable of being extended ever ſo finely over a perfectly ſmooth ſurface, ſuch as that it fell on, and that itſelf formed for the next to fall on, muſt both from their origin naturally and neceſſarily be. That theſe zones are thus finely extended, is obvious to the naked eye in many ſpecimens of the bluiſh-white Onyx, and of the Oriental Sardonyx, and ſome others; but the Microſcope makes it yet more evident, for by it we diſcover a multitude of zones, indiſtinguiſhable by the naked eye, and lodged between the external viſible zone, and the coat of the common matter that covers all, even in almoſt all the ſpecies of this ſtone.

SERIES III.

CLASS III. ORDER II. GENUS III.

SARDONYCHES.

Semipellucid Gems of the Onyx ſtructure, zon'd or tabulated, and compoſed of the matter of the Onyx, variegated with that of the red or yellow Carnelian.

1. *Sardonyx ruber zonis tenuiſſimis, ſive*
Onyx albida zonis niveis & rubentibus tenuiſſimis, quæ Onyx in qua color Sardæ antiquorum.
The thin-zoned red Sardonyx, or whitiſh Onyx with thin, ſnow-white, and red zones.

THIS is one of the moſt beautiful and elegant of all the Gems of this Genus: It is the *Onyx in qua color Sardæ*, Pliny, Vol. II. p. 778. but not the Sardonyx of that author, but is the Sardonyx Boet. p. 242. Aldrov. Muſ. Met. 919. Cæſalpin de Metall. 121. &c.

It is of an extreamly fine, compact and firm texture, of a rugged, irregular and unequal ſurface, generally of a ſomewhat roundiſh ſhape, tho' ſometimes flatted, and from one to five or ſix inches in diameter, tho' ſpecimens ſo large as that are ſeldom found, and, if perfect are extreamly valuable. It is by much the moſt beautifully and regularly zon'd of all the ſtones of this claſs; many of them are at times elegantly ſtreaked with a vaſt number of fine zones, but this almoſt conſtantly and continually is ſo. The colour of its ground is ſomewhat whitiſh, but the moſt approaches to pure Cryſtal, and has the greateſt brightneſs and tranſparency of all the ſpecies. Its zones are almoſt inconceivably minute and fine. They are either of a pure white, a true Carnelian-red, or a fleſh-colour, made up of an admixture of theſe two; there is red in different degrees in the different ſpecimens, and often in the different parts of the ſame ſpecimen, and is extreamly elegant. When in the pebble ſhape, which is its moſt conſtant form, it has ever a large central nucleus of very pure Cryſtal, and that leſs ſhattery in its ſtructure, and more bright and pellucid than in any other ſpecies, and this is incloſed in and ſurrounded by the zones, placed in various aſſortments; ſometimes the red, white and fleſh-colour are placed in a regular, alternate order; ſometimes only two of them are ſo, and very frequently there are whole numbers of the ſame ſort together, only divided alternately by thin ones of the common matter of the ſtone. They are ſo fine, and conſequently ſo very numerous in this ſpecies often, that it is ſcarce conceivable. I have a ſpecimen in which there are more than fifty zones in the compaſs of one third of an inch. It breaks with an extreamly even, polite and gloſſy ſurface, little inferior to that of pure Cryſtal, and is the moſt tranſparent where the zones are wanting of all the Onyxes. It is extreamly hard, and takes an elegant poliſh.

It freely ſtrikes fire with ſteel.

It makes no efferveſcence with Aqua Fortis.

It burns to a pale fleſh-colour'd and whitiſh maſs.

Examined by the Microſcope, it makes a very elegant appearance: the ground is little inferior to pure Cryſtal in any of its qualities, and the zones are of the ſame Cryſtal, debaſed by white or red Earth in different degrees, and according to the quantity of this in the mixture, are more or leſs tranſparent. The white zones are made of a regular admixture of Earth with the Cryſtal, equally diffuſed, and making one even maſs; but it is not ſo with the red, the earth there is mixed as in the Chalcedonies, not in a continued equal maſs, but in really ſeparate moleculæ: theſe are often ſo ſmall as perfectly to eſcape the eye, without the aſſiſtance of glaſſes, and make that part of the ſtone where they are, appear of a plain, uniform red, but examined with the aſſiſtance of good glaſſes, the red matter is every where ſeen evidently diſpoſed in multitudes of diſtinct moleculæ, and plainly ſeen in multitudes of blood-colour'd drops; theſe are diſtinguiſhable in, among, and between the otherwiſe white zones, and according to the quantity they are in, make them either appear of a ſtrong red, or of a deep fleſh-colour. When they have been once ſeen by the Microſcope, the naked eye will, in moſt ſpecimens, be able to diſcover them; and ſome pieces I have ſeen of it, in which they were plainly diſtinguiſhable among the zones in large points, and others, where they have been thinly ſcatter'd among the pure and pellucid matter of the nucleus, in which caſe they are ever diſtinguiſhable, tho' almoſt ever ſo ſmall.

This ſpecies ſeems to be the product of the Eaſt-Indies alone, no ſpecimen that I have ever heard of being brought from any other place. Our Lapidaries are for diſtinguiſhing between this and the following ſpecies, as the Oriental and German Sardonyx; but they are in reality two abſolutely different ſtones, the following having a different ground, and never the leaſt appearance of the white veins that make ſo elegant a part of the variegation of this.

It is cut into ſeals, as the others of this kind, and is more valuable than any other ſpecies. It is not common among us however; and our Jewellers very commonly know another ſtone under its name, a broad-vein'd Agate, before deſcribed. Neither are they wanting in a proper counterfeit for this, any more than for the blue and white Onyx; nay, they even make it from the ſame ſtone: the white Gumbay Agate, where vein'd (for they don't ſeem to diſtinguiſh between the veins of Agates and the zones of the Onyx) and free from the Dendritæ, which make it what is called a Mocoa ſtone, is by a ſecret they don't care to part with, ſtained in its veins to a deep red, and, tho' not at all reſembling this true Sardonyx, yet, being then very like the Agate, they have taught themſelves to call the Onyx, is put off under the name of a Sardonyx; and moſt of the tops of ſnuff-boxes, which are ſo frequent among our Jewellers under the name of Sardonyx, are of this very ſtone, thus altered.

2. *Sardonyx ruber zonis latioribus, ſive Onyx cornea zonis rubris latis punctatis.*
The broad-zon'd red Sardonyx, Or horney Onyx with red punctated zones.

This is a ſpecies not without its beauty, tho' greatly inferior to the former in all reſpects. It is of a moderately firm, compact and cloſe texture, of a tolerably ſmooth and equal ſurface, and very various in ſhape and ſize; ſome ſpecimens of it being of leſs than an inch, others of eight or nine inches in diameter, and commonly of a roundiſh, pebble-like form, tho' not unfrequently irregular and flat. It is of the ſame tabulated or cruſtated texture with the reſt of the Onyxes, for the additions of freſh matter that make the ſeveral zones are in all, if formed round a central nucleus, ſo many regular cruſts; and if flat, ſo many plates or tables formed by the mere ſubſidence of the matter at different times. The ground or baſis of this ſpecies has nothing of bluiſhneſs or whitiſhneſs in it, but is of a true horn-colour, and much reſembling ſome of the Oriental Agates. The zones are all of one colour and one ſimilar ſubſtance: they are compoſed of the genuine matter of the common red Carnelian, that is a fine Cryſtal, debaſed by a copious admixture of a red Earth. Theſe zones are generally very ſingular in their order and diſpoſition in the ſtone; for what I call broad zones, if nicely viewed, will be found to be each compoſed of three or four other narrower ones laid pretty cloſely together, yet ſeparated by alternate ones, of the matter of the baſis; and theſe complex zones each divided from the other by clear ſpaces that is by a zone of the common matter of the baſis, of different breadths, but often as wide as the complex red one, which is frequently $\frac{1}{12}$ of an inch. I obſerved from examinations by the Microſcope in the former ſpecies, that its red zones were not ſo many continued quantities of this red matter, but were compoſed of multitudes of extreamly minute, red moleculæ, ſeparate from one another, and in form of ſo many ſpots. This, which was there diſcoverable only by the Microſcope, is here evident to the naked eye; each narrow zone, which goes to compoſe the broad complex one, being indeed no other than a ſingle, double or triple row, of diſtinct moleculæ, or ſeparated, roundiſh, red ſpots, large enough in moſt places to be extreamly eaſily diſtinguiſhed by the naked eye, tho' in the different parts of the ſame ſpecimen, they are ever various in ſize and order.

It breaks with a very fair, flinty ſurface, and is moderately pellucid, very hard, and capable of a good poliſh.

It freely gives fire with ſteel.

It makes no efferveſcence with Aqua Fortis.

It burns to a white maſs, vein'd with a dusky and diſagreeable brown.

The Microſcope only ſhews more diſtinctly in this ſpecies what is plain enough without its aſſiſtance in many places; we find by it, however, that thoſe zones in which the natural ſtructure and compages is leſs obvious to the eye, are in reality exactly the ſame with thoſe, where it is more plainly ſeen.

This is common in America, particularly in New Spain, and is found beſides in Egypt, and in many parts of Europe. The Dukedom of Lorrain abounds with it; but the large ſpecimens are found only in New Spain, and there not plentifully.

It is ſometimes cut into ſeals, ſnuff-boxes, ſmall vaſes, and counters for cards, but is not much valued.

3. *Sardonyx lutea, ſive Onyx cornea zonis albidis & flavis. Quæ Onyx in qua Chryſolithi color, Sudinis & Antiquorum.*
The horney Onyx with whitiſh and yellow zones, properly the yellow Sardonyx.
The cryſolite Onyx of Sudines and the Antients.

This is a very elegant ſpecies of this Gem, and is extreamly different from moſt of the other ſpecies, not only in its colours, but in its general ſtructure. It is of an extreamly fine, even, compact and firm texture, of a rude, rugged and unequal ſurface, and ſubject to a number of ſuperficial cracks. It is found in larger maſſes than moſt of the other Onyxes, and ever in a flat, irregular form; many pieces of it have been ſeen of four or five inches long and two or three broad, but they are ſeldom more than an inch and a half thick, and ſo ſubject to ſuperficial perpendicular cracks, and to horizontal ones that go through the whole ſubſtance, that few pieces can be worked to any great advantage. It is ever of a moſt elegantly tabulated or plated texture, and its zones, which in the other ſpecies, in general, are ſo many thin cruſts ſurrounding a nucleus, are here ſo many thin, but regular and beautiful plates, made by ſo many different ſubſidences, and laid moſt evenly on, and in general firmly united to, and cohering with one another. The colour of the ground or baſis of the ſtone is a ſomewhat opake browniſh white, or true horn colour; a large plate of this generally makes the bottom part of the ſtone: the zones are ſome of an obſcure and ſomewhat bluiſh white, and others of a very bright, elegant, and beautiful yellow; theſe make a great number of plates one upon another, ſometimes regularly diſpoſed in an alternate order on one another, but more often with other zones of the horny matter of the baſis, in different places between them; theſe generally make up the central part of the ſtone, and are covered at top, as they were ſupported at bottom, by a plate of the horny matter of conſiderable thickneſs. The yellow zones here are very beautiful and bright, and often truly of the colour, though without the brightneſs, or tranſparence of the Chryſolite of the antients: many have looked on Pliny's account of this ſpecies as fabulous; ſuppoſing that he had meant it of an Onyx with veins of that gem in it; but it is very plain, that neither he, nor the author he quotes, meant to ſay any ſuch thing; all that they expreſs is, its having the colour of the Chryſolite, which it evidently has: and the matter of its yellow veins is of the true yellow Carnelian, of a more than ordinary fine colour. It breaks with a fine ſmooth and ſhining flinty ſurface, and is very bright, when cut into tolerably thin-plates, is conſiderably tranſparent, though much leſs ſo than either of the former ſpecies: it is of great hardneſs, and takes a fine poliſh.

It very freely gives fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a pale fleſh-coloured and whitiſh maſs.

Examined by the microſcope, its ground or horny baſis, appears very bright and pellucid, and but little clouded with its debaſing earth; its veins differ not leſs in ſtructure and purity than in colour; the white are highly ſaturated with earth, and very opake, and the yellow even more pure and pellucid than the ground.

It is found in many parts of the world, but no where in any plenty; it being a rare thing to meet with two ſpecimens of it any where together. Arabia, Armenia, Perſia, China, and New Spain, have at times been all found to produce it. The Italian Lapidaries are very fond of it, though it can ſeldom be worked into any thing of ſize. In England we ſcarce ever meet with it.

Its ſtructure ſhews its origin different from thoſe hitherto deſcribed: it is plainly compoſed only of a number of different ſubſidencies from the once univerſal fluid, which, where they fell quickly upon one another, and met, while both were yet thoroughly moiſt, have cohered firmly together; but where ſome had intervened, and the laſt formed plate was already hardened when the ſucceeding one fell upon it, they could only ſlightly cohere: and at theſe commiſſures it is, that we find the ſtone ever ſo ready to ſplit horizontally, and according to the number of theſe is the value of the ſtone; where there are only one or two of them in an inch and half thickneſs, the intermediate firm parts may be cut to ſome advantage; but where they are more numerous, little uſe can be made of the ſtone, as the tranſverſe ſurfaces of the pieces cut from it can only be very ſmall; and every one knows that an horizontal ſurface of an onyx can expreſs no zones, nor be of any great value.

4. *Sardonyx Aurantia, ſive*
Onyx Albido ſubcæculea Zonis Aurantiis, & albidis.
The orange Sardonyx, or bluiſh white Onyx, with orange-coloured and whitiſh Zones.

This is a very ſingular ſpecies, and is not without its beauty, though greatly inferior to the precedent: it is of a fine compact texture, of a ſmooth, even, and regular ſurface, and is various in ſize and ſhape; for though generally of a figure approaching to round, and from one inch to two in diameter, it is ſometimes ſeen flat, oblong, and two or three inches in breadth; it is of a very regular and beautiful ſtructure; its central part being almoſt conſtantly, whether the maſs be flat or round, a large maſs of the bluiſh white ſubſtance of the ground; and its zones ever conſtantly and regularly of a beautiful orange colour, frequently very deep, though ſometimes a little paler; theſe are ſometimes diſpoſed alone over and below the nucleus, and ſo blended with one another, as ſcarce to be diſtinguiſhable from one broad zone; though, if attentively examined, they always may be diſcovered to be diſtinct, even in this cloſe aſſemblage, the upper part of each zone being ever of a paler colour than the reſt, and that falling cloſe in with the darker colour of the next, will ſhew an accurate eye, the commiſſures of every one: it is ſeldom, however, that they are thus lodged together; they are generally kept ſeparate by alternate zones of the matter of the nucleus or baſis of the ſtone laid evenly between them, and ſometimes by another ſet of zones, of exactly the ſame texture with themſelves, but of a paler, opake white. It breaks with a tolerably ſmooth and gloſſy ſurface, is moderately bright and tranſparent in the ground; but the zones are very dull and opake; it is, however, of conſiderable hardneſs, and capable of a good poliſh.

It readily, and very freely gives fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It burns to a duſky reddiſh brown in the zones, and in the reſt to a pure white.

Examined by the microſcope, the ground appears like that of the reſt, a cryſtalline matter, but ſlightly debaſed by earth. The zones are of a fine colour, but very opake and dull, as being highly ſaturated with earth. A thin plate of it, where theſe are alternately variegated with zones the ſame with the ground, makes a very agreeable figure, being juſt half pellucid and half opake; and where theſe yellow zones are ſeparated by the white ones, it is darkeſt of all, theſe being perfectly opake.

It is found in Ægypt, Arabia, and the Eaſt-Indies, and in Germany and Bohemia; the European is much inferior to the oriental, neither of them are, however, much eſteemed any where, becauſe, though their colours are pleaſing, they want the brightneſs of the more valued ſpecies. The matter of the yellow veins of this, as of the former, is, though coarſe, a true yellow Carnelian, and the ſtone properly a coarſer yellow Sardonyx.

SERIES III.

CLASS II. ORDER II. GENUS IV.

CAMEA.

Semipellucid Gems approaching to the onyx ſtructure, being compoſed of zones, and formed on a cryſtalline baſis; but having their zones very broad and thick, and laid alternately on one another, with no common matter between: uſually leſs tranſparent, and more debaſed with earth than the Onyxes.

1. *Camea hebes Zonis latiſſimis albis & nigricantibus, quæ*
Camea & Camehuia Recentiorum, Onyx Arabica Antiquorum.
Dull-looking Onyx, with broad, black, and white Zones.
The Camea of the Moderns, and Arabian Onyx of the Antients.

THIS is a very ſingular ſpecies of Onyx, and in the hand of the ſculptor is often ſeen to make a very elegant figure; it is of a moderately compact, cloſe, and firm texture, of a ſmooth and equal ſurface, generally of the roundiſh form of the other pebble-like Onyxes, but ſometimes broad and flat. The pebble-faſhioned pieces are from one to three inches in diameter, the flat ones ſeldom of more than two; this is ſomewhat ſingular in it, becauſe in all the other ſpecies found at times in theſe different forms, the flat ſpecimens are generally the moſt bulky; the flat ones, in theſe, are not only the leaſt valuable in regard to ſize, but they are frequently ſubject alſo to tranſverſe or perpendicular flaws and fiſſures, which often divide a ſtone into pieces not worth the working, though otherwiſe it might from its general ſize have been of ſome value. The firſt concretion or baſis of the reſt of the maſs has been in all theſe a coaleſcence of a quantity of very nearly pure cryſtal: in the roundiſh maſſes this has ſerved for the central nucleus, round which the matter of the Zones has been diſpoſed; and in the flat ones it generally is found to make the bottom plate or table. The Zones of this ſpecies are very broad, large, and thick, and are of no other colours but black and white, and thoſe ranged in a regular alternate order, but not always very regular in their breadth; often indeed in this alſo they are nearly equal, and take up an eighth, tenth, or ſixth, of an inch ſpace each; but in other maſſes one finds them ſo variouſly diſpoſed, that it would be natural enough to call the one or the other the common matter of the maſs, and the Zones its variegation, the black ſometimes making very broad, and the white extreamly narrow Zones, and the white at others very broad, with the black very narrow ones; and this ſometimes in the different parts of the ſame maſs. The cryſtalline nucleus, or baſis, in this ſpecies, is the only part that is of any degree of purity, and that is commonly ſhattered, cracked, and very irregularly concreted; but the zones are extreamly loaded with earth, and ſo dull and opake as to be miſtaken by a very judicious Lithologiſt, no leſs a man than De Laet, for marble. It breaks with a tolerably ſmooth, though leſs gloſſy ſurface, than any of the other kinds, is conſiderably hard, and capable of a fine poliſh, but whenever ſo well wrought is but very imperfectly tranſparent.

It freely gives fire with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It burns in its black parts to a grey, in the reſt to a pure white.

Examined by the microſcope, it appears very different from any of the ſpecies hitherto deſcribed; its nucleus is indeed like the cryſtalline centre of the reſt, but its zones are of a texture extreamly more impure; they are very opake, but not without ſome brightneſs, of a ſomewhat rude and irregular texture, and often brighter in ſome parts than in the reſt; they are evidently compoſed of cryſtal, debaſed by a large quantity of earth, and the black and the white ones differ in nothing but colour.

This ſpecies is found in Ægypt, Arabia, Perſia, and the Eaſt-Indies. The Jewellers and Lapidaries have always been very fond of it; they cut heads or other figures in it, cutting through one of the zones to the ſurface of the other; if they intend it cut in, they go every where through the upper to the under zone, and the figure is then ſeen perfectly in that; if they are to leave the figure prominent, which is the uſual caſe, they cut their lines from the upper down to the under zone, and then cut away all the remainder of the upper, leaving nothing of it but the figure: if this be of the white, it looks like a white head faſtened on a plate of a black ſtone; if the black, a black head or other figure faſtened on a table of a white one.

This ſpecies has been called Camea Camehuia and Memphites, by different authors, and generally allowed by the judicious, as it certainly is, the Onyx Arabica of the antients. The excellent De Laet, however, diſſents from this: *Alii Lapidem illum quem Cameum dicunt, ſuperficie candida ſeu lactea radice nigra Arabicam Onychem judicant, cum potius marmoris ſpecies videatur,* are his words. On which, it may not be improper to obſerve, that his deſcription ſeems to have been formed only from ſpecimens found among the Jewellers, and thoſe perhaps cut; for though the zones are alternately black and white, and that without any regularity, the central nucleus, or the under table, if the ſpecimen be flat, is never black, but always cryſtalline and purer than the reſt: this is what that author means by the radix; and if a thouſand of the roundiſh ſpecimens be broken, his account will be ever found to be erroneous; that radix, or nucleus, being ever, as in the other Onyxes, cryſtalline and white; all the flat ones I have met with perfect, have alſo had their bottom table of the ſame matter, though ſome which have ſuffered accidental injuries, may be found with it intirely, or in part, worn or broken off; and as to the ſuperficies, whatever it may be the pleaſure of the Lapidary to make it, when he intends it for uſe, in its natural ſtate, and ſurely that is the only ſtate in which a naturaliſt ſhould deſcribe it, it is perfectly irregular and uncertain, as to which colour that ſhall be of, as many ſpecimens being found with it of one, as of the other of its colours.

That this Camea of the moderns was in reality the Onyx Arabica of the antients, notwithſtanding the opinion of this author, I ſee no reaſon to doubt, eſpecially as both the deſcription that author gives of the ſtone, and his cauſe of doubting it, are plainly erroneous. Our Camea is an Onyx, which in the different ſpecimens, may be called either black with white zones, or white with black ones, according to the breadth of thoſe of either colour; but the black being generally the broader, would lead us moſt naturally to call it a black ſtone with white zones; and this is all the deſcription Pliny gives us of it, he ſays, V. 2. p. 778. *Arabicas Onyches nigras inveniri candidis Zonis.* And as this is the whole deſcription the antients have given us of their Arabian Onyx, and there is nothing in it but what perfectly agrees with our Camea; and as the Arabian Onyx of the antients was common, and our Camea is ſo ſtill, and there is abſolutely no other ſtone now known that can be their Arabian Onyx; it follows, that, as a ſpecies once ſo frequent cannot probably be loſt, it is very juſtifiable in us to determine, that a ſtone yet common among us, alone anſwering the characters of theirs, and anſwering all its characters, is the very thing they knew by that name.

I am ſenſible, that had I been willing to acquieſce in the opinions of the reſt of authors on theſe ſubjects, it had been very ſafe for me to have acquieſced in this of the lateſt of them; but, as in this, and all other things, I propoſe to myſelf to make this hiſtory not a collection from others, but a new work founded on perſonal obſervations and experiments, I ſhall not ſcruple to deviate from the opinion of the greateſt of them, where theſe will warrant my doing ſo: in this particular, I am aware that the greateſt are againſt me, but am alſo confident, that experiment will ſhew that they are againſt truth and right reaſon too. The Lithologiſts are, indeed, of all authors, the greateſt Plagiaries: every one who has read them, will find that reading one of them is much the ſame thing with reading them all; and that in a ſubject where perſonal diſcoveries went but a little way, they have all adopted not only one another's ſentiments and opinions, but their words and ſentences; examples for which, even for whole pages together, are but too frequent with many of them; and that without the leaſt hint at the name of the author, or that they were from any where elſe.

De Laet is the only one of the late writers on theſe ſtudies, who has, with any degree of care, read the criticiſms of the excellent Salmaſius; that great Author, from his indefatigable labour in collecting the parallel paſſages of the antients, and reſtoring many of them to their true ſenſe, has been of infinite uſe to all thoſe who ſhall follow him; and from the bare compariſon of theſe authors with one another, has hit upon ſome diſcoveries, which it is amazing that any man who wrote in his cloſet only, and had in very few caſes any knowledge of the things he wrote about, could make; and which it would be unpardonable in any after writer on thoſe ſubjects not to commemorate. This great critick is, however, to be read with great caution; he is very fond of any new hint he ſtarts, and is very precipitant in his concluſions from it; and though to a man, who ſits down to read him with a fund of real knowledge in nature already laid in, from having been long converſant among her works, he may give hints of the greateſt uſe; yet to one who would follow him in all his opinions, he would prove the moſt dangerous of all miſleaders.

It is from this author, (whoſe character, in regard to theſe ſtudies, I have thus impartially given, that we may know exactly how far he is to be depended on for new diſcoveries,) that De Laet has copied his conjectures and accounts of the Onyx Arabica and Camea. The ſubſtance of what Salmaſius ſays, on this occaſion, is, that ſome would have the Camea, before deſcribed, to be of the kind of the Arabian Onyx, but that they are nothing alike, nor indeed of the ſame claſs of foſſils; for that the Arabian Onyx had white zones and a black ſuperficies, and our Camea a white ſuperficies, and black radix or root: he adds alſo, that it is more properly of the Marble than of the Gem-claſs; that it was often ſeen in large flat pieces, and was properly a Marble of a black body, with a milky-colour'd ſuperficies. Hence the determination of De Laet againſt our Camea's being the Arabian Onyx of earlier times. The uncertainty of the zones or plates of this ſtone, as to which is, or which is not the ſuperficies, and the account of what is properly its radix, have been already mentioned. It remains to enquire into the propriety of eſteeming our Camea a Marble rather than an Onyx. Hitherto the characters of the different claſſes of Foſſils have been ſo little known, that it can be no wonder to find thoſe of one claſs miſtaken for thoſe of another; and, if a perſon judges by the eye alone, as has hitherto been the way, the true characters of theſe bodies are ſo little expreſſed on their ſuperficies, that errors are not to be avoided. Many of the Jaſpers are not by eye alone to be known from Marbles of the ſame colours; and, in favour of Salmaſius,

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it is but juſtice to obſerve that the Camea here deſcribed, is leſs bright on its ſurface than many of the Marbles. When we know however, that Marbles and Onyxes are of a different origin, compoſed of different ſubſtances, and exhibiting different phenomena and effects on various trials, and yet thoſe ever the ſame in all the ſpecies of each of the claſſes, we can no longer confound one with the other, or doubt to which of two ſo different Genus's any given body is to be referred.

The Marbles are all compoſed of Spar, and in conſequence of that will ferment with Acids, and will not ſtrike fire with ſteel; not to mention their other characters. The Onyxes are all compoſed of Cryſtal; even the coarſeſt of them, being evidently ſo, only more debaſed by earth; and theſe, in conſequence of that, will, like Cryſtal, ſtrike fire with ſteel, and will not ferment with Acids. When we know theſe fixed, eternal, and invariable principles, it is eaſy to determine the diſpute, by giving the Camea theſe two eaſy trials; and the conſequence is, that it proves a true Onyx, and ſhews that it contains no grain of the matter of marble in it.

What has led Salmaſius into the error of imagining it was found in vaſt pieces, is, that our Jewellers are cunning enough to uſe ſometimes the black and white Jaſper, deſcribed before, in its place. This is common, and is ſometimes found very large, but even this is not Marble, nor have I ever ſeen one figure, even of the very worſt of what have been called Camea's, that ever was cut on Marble.

2. *Camea hebes, zonis latiſſimis albis & virentibus.*
Jaſpi-Cameo Italorum.
Dull, broad-zon'd, green and white Camea.
The Jaſpi-Cameo of the Italians.

THIS is a very elegant and beautiful ſpecies, abſolutely different from the Jaſponyx, before deſcribed, and placed here after the ordinary Camea, as much reſembling it in all things but colour.

It is of a moderately fine and compact texture, of a ſmooth, even and regular ſurface, and very uncertain in ſhape, being ſometimes roundiſh, or pebble-ſhap'd, ſometimes flat, and often perfectly irregular. It is always ſmall, few ſpecimens having ever been ſeen of it of ſo much as two inches in diameter. It is of the ſame ſtructure with the reſt of the Onyxes; when round, it has a cryſtalline nucleus, round which the zones are laid; and when flat, it has the ſame Cryſtal for its bottom table; and the zones are evenly and regularly ſpread upon it. I have never once ſeen this wanting on what has been the lower part of a ſpecimen, unleſs when the ſtone has plainly ſuffered accidental injury. The zones are always broad, and generally pretty regularly ſo: They are diſpoſed alternately, and are ſome of a very pure and elegant white, and the others of a fine ſtrong green. It is uncertain which of theſe ſhall be the ſurface; but the nucleus, or bottom table, is ever Cryſtal. It breaks with a ſomewhat rough ſurface, and with but little gloſs or brightneſs, but is conſiderably hard, and capable of a fine poliſh, tho' without much tranſparency.

It very freely ſtrikes fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns, in the green parts, to a duſky-grey, in the reſt, to a pure white.

Examined by the Microſcope, the white zones appear of a cryſtal, as much ſated with earth as thoſe of the ordinary Camea; but the green are ſomewhat purer, and have more brightneſs, eſpecially in ſome parts, and ſeem very much of the Jaſper texture.

It is found in the Eaſt-Indies, and in ſome parts of America. We have of it brought into England, but it is little regarded with us. The Italians and Germans have begun to take great notice of it; the former eſpecially, who eſteem it ſuperior to the ordinary Camea, and have given it the name it has, compoſed of the Camea and Jaſper, of which nature they very rightly determine its green zones to be. The green Jaſpers are evidently Cryſtal, debaſed by Earth, and tinged by Copper; and ſo do all trials prove thoſe green zones alſo to be.

3. *Camea dura zonis albiſſimis & caſtaneis latis.*

The hard Camea with broad white and cheſnut-colour'd veins.

THIS is a very elegant and beautiful ſpecies, and tho' now not frequently found, muſt have been very common among the antients, tho' not particulariz'd by name by Pliny, ſince we find a great number of true antique figures engrav'd on it.

It is of an extreamly fine, ſmooth and compact texture, of a rude, unequal and irregular ſurface, very indeterminate as to the ſhape, but almoſt conſtantly flat, and oftener oblong than round, and always is found ſmall, no ſpecimen I have ſeen of it exceeding two inches any way. Its ſtructure is tabulated like that of the reſt of the Camea's. The tables, which make the zones, are very broad and thick, and laid on one another in a regular, alternate order. They are of two colours, but of much the ſame degree of fineneſs in both; the one ſet of them are of a pure and delicate white, not inferior to that of the pureſt ſtatuary marble, and having indeed much of the external reſemblance of it, and the other of a beautiful cheſnut-colour; theſe, tho' laid very ſmoothly on one another, are not always even at the edges of the maſs, for ſome being a little larger, ſtand out in regular prominencies, a little beyond the ſurfaces of the upper and under zone, and ſo far as can be judged from what ſpecimens I have ſeen, the brown or cheſnut-colour'd zones are always thoſe which ſtand out beyond the reſt, as the white make always the natural baſis, or firſt or bottom plate of the maſs. The white zones have but little tranſparency, and the brown ones ſomewhat even leſs than they. Theſe laſt are of the true Carnelian texture, and, were there any Carnelians known of that colour, could not but be allowed to be truly of the matter of them. They are indeed ſo far of the Carnelian nature, that they are compoſed of the ſame Cryſtal with that ſtone, and debaſed by much the ſame quantity of earth, tho' that be of another colour. Theſe zones are often a ſixth of an inch broad. It breaks throughout with a very fine and regular flinty ſurface, and is no more ready to part at the commiſures of the zones, than in any other direction. It is conſiderably hard. It is conſiderably hard, and takes a very elegant poliſh.

It very readily and freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a paler brown in its colour'd zones, and to a yet purer whiteneſs in the white.

Examined by the Microſcope, it appears of the ſame ſtructure in both its ſets of zones; very opake in both, but of a very equal and fine texture, and gloſſy ſurface. In the brown zones one can ſometimes, tho' that very ſeldom, diſcover a ſpeck more loaded with earth, and conſequently of a deeper colour and coarſer texture than the reſt; but theſe are not diſcoverable without the aſſiſtance of glaſſes, and even the ſharpeſt magnifiers ſhew none ſuch in the white.

We ſometimes have ſmall pieces of this among India ballaſt, but it is not regarded nor ever enquired after by our Lapidaries in this rough ſtate, tho' they are well acquainted with it in the antique Gems: this is the ſtone that in theſe Gems they know by the name of the Sardonyx, for they ſeem to know nothing of the true Sardonyx, to be next deſcribed. Some good judge or other has probably, however, given the occaſion to this error, by calling the proper Sardonyx of Pliny's time by its right name; and others, not knowing that the word expreſſed the Carnelian's making a part of the ſtone, afterwards applied it to this, which in all things reſembles that Gem, except in its having no Carnelian in it. I find it a common opinion among them alſo, that the ground, as they call it, or white zones of this (for moſt of the figures on it are left ſtanding from the brown zone and the white makes, the table) is of the nature of white marble: and this is an error that no leſs ſagacious a Naturaliſt than De Laet has run into, as has been already obſerved, in regard to the ordinary Camea; probably enough the origin of it was from him. I have in vain endeavoured to convince ſome of them of the error of this, by comparing the texture, &c. of this with Marble, but the trial by pouring a drop of Aqua Fortis on one of theſe and on a piece of Marble, and ſeeing it ferment with and diſſolve the one, and not at all affect the other, has been generally acknowledged convincing.

4. *Camea duriſſima zonis cœruleo albidis & pallide rubentibus latis.*
Sardonyæ Plinii ævi.
The hard Camea with bluiſh-white and fleſh-colour'd broad veins.
The Sardonyx of Pliny's time.

This is the moſt elegant, as alſo the ſcarceſt of all the ſtones of this Genus; and though the Sardonyx, before deſcribed among the Onyx, was properly the Sardonyx of the earlieſt ages; yet this, which is a true Camea, and not an Onyx, was in the days of Pliny the ſame ſtone, known by that name, and univerſally received as ſuch. It is the Sardonyx Plinii. De Laet.

It is of an extreamly fine, compact and even texture, of a tolerably ſmooth ſurface; in ſhape generally flattiſh, tho', from ſome broken ſpecimens that I have met with, I doubt not but, like the other Camea's, it is alſo ſometimes roundiſh, or of the pebble ſhape. It is ever ſmall; the largeſt piece I have heard of not exceeding an inch and half in diameter. Its ſtructure is plainly the ſame with that of the other Onyxes and Cameas; a cryſtalline matter has firſt concreted in the once univerſal fluid, and either has ſerved for the nucleus or baſis of the zones, which either are expanded round, or laid evenly on it. They are only of two colours, a fine bluiſh white, like the Chalcedony, or matter of the fine bluiſh white Oriental Onyx, and an extreamly beautiful pale red, plainly of the Carnelian kind, but more elegantly and more bright, tho' not at all more tranſparent than the finer Oriental Carnelians. Theſe are generally very broad, an eighth or a ſixth of an inch being no uncommon breadth in them; and what adds much to the beauty and value of the ſtone is, that they are commonly very regularly of the ſame breadth throughout the maſs; they are placed in a beautiful and regular alternate order, and have no other matter but themſelves to divide them from one another, as the Onyxes moſt uſually have.

It breaks with a ſmooth, even and gloſſy ſurface; is of a very great hardneſs, and capable of an elegant poliſh, tho' with much leſs tranſparency than the Onyxes.

It very freely gives fire with ſteel.

It makes not the leaſt effervescence with Aqua Fortis.

It burns to a duſky-brown, in the red parts, and to a very pure white in the reſt.

Examined by the Microſcope, the white zones appear of a very equal and elegant ſtructure; they ſeem almoſt as ſmooth and gloſſy as the Onyx or Chalcedony, tho' almoſt perfectly opake, the earth in their mixture ſeeming more perfectly united than in almoſt any other ſtone where there is ſo much of it; the fleſh-colour'd zones are even more opake than the white, but very beautiful, and of an even, regular texture.

All that I have heard of this ſpecies has been brought only from the Eaſt-Indies. We at preſent ſeem to have little knowledge of it among our Lapidaries, tho' in very early ages, and even in ſome much later, they muſt have had it in uſe, ſince we meet with very beautiful heads, &c. cut in it, thoſe not only antique, but of later date. It ſeems to have been the univerſal cuſtom to have left the figure ſtanding out in the red zone, and made the table of the white. I am apt to believe we might ſtill have this elegant ſtone from the Eaſt-Indies in ſufficient plenty, if it were properly ſought after. The Camea's in general are but of unpromiſing ſurfaces, and therefore I preſume often paſſed over and diſregarded. In Italy they now have ſpecimens of this in the cabinets of the curious, and figures engraved on it are much eſteemed.

If the Sardonyx of the modern Jewellers be in general very different from the other Sardonyx deſcribed among the antients, as has been already obſerved, it is plainly much more ſo from this, ſince it is not eaſy to conceive either a natural or artificial-colour'd Agate can ever come up to the characters of this ſtone. There is no doubt, however, of its being the very Sardonyx of Pliny's time, from all that author has left us about it. He tells us, that it was a Gem much eſteemed by the Romans; and that the ſtone, originally ſo called, was compoſed of fleſh-colour'd and white plates, laid evenly on one another, and both tranſparent, *velut carnibus ungue hominis impoſito & utroque trans accido.* De Laet, who has taken a page or two from Salmaſius on this occaſion, diſputes it with him, about whether the fleſh-colour or the white were the upper or ſuperficial colour in this ſtone. But, as has been already obſerved, that is a thing perfectly accidental and uncertain in the Camea kind, where there is properly no common matter, but the ſtone is compoſed only of the zones, whereas where there is a common matter of the maſs of the ſtone, and the zones are only ſo many regular veins in it, it is very certain that this common matter ever makes the external covering of the whole, and is properly the ſuperficial colour. It is very evident that Pliny is in this place firſt deſcribing the Sardonyx before deſcribed among the Onyxes, and which is properly an Onyx, not a Camea, and conſequently has a common matter beſide its zones, which common matter muſt be the external ſuperficial coat or colour. Salmaſius therefore was certainly right here in making the white part the upper or ſuperficies of the ſtone; tho' not having enquired into nature's ſelf, or her fixed laws in theſe caſes, it was not from obſervation, but merely from the plain conſtruction of Pliny's Latin. As Pliny had called the one colour the white Unguis, the other a red Carnes, his ſaying *Ungue impoſito carnibus*, could have no other conſtruction than what Salmaſius has explained it by, the white, or Onyx-like matter, making its ſuperficies and the red or Carnelian-like its baſis or bottom. And De Laet does as much violence to the Latin as to the ſenſe of the author, in wanting to invert this order of the zones; and that I am afraid is only from his deſcribing the wrought inſtead of the natural rough ſtones, in the former of which, as I have before obſerved, the red is indeed ever made the upper colour. This Oriental Onyx was the Sardonyx of the earlieſt ages we have accounts of: and Pliny alſo informs us that theſe were of Indian origin, and were allowed to be the true Sardonyxes by the authors before his time.

Another ſort of them he next mentions, which he ſays were *Cæcæ: Quas non traluceant cæcas apellantes*; and theſe, he ſays then, at his own time, were moſt in repute, and had got the name and character of the true Sardonyx. What this author means by *cæcas* is what I have expreſſed by the more familiar word *hebes*, and he ever means by it ſtones of a dull look, and little tranſparence. He calls the obſcure opake Emeralds by the ſame term, *ſunt aliqui obſcuri quos vocant cæcos*; and there is no doubt but by this dull and leſs tranſparent Sardonyx he meant the very Camea here deſcribed.

Many have wonder'd how Pliny came to talk of the Arabian Onyx, before deſcribed, among the Sardonyxes, as he has plainly done; but it is very clear, that he only meant by this to keep together the Gems of the ſame ſtructure and external figure. It is true, that the Arabian Onyx had no red in its black part, but Pliny hints at its having ſome tendency to redneſs ſometimes in its white. Whether this was the caſe, or whether the author only hints at it as an excuſe for his placing that ſtone there, is not eaſy to ſay, ſince, tho' we ſee none of the ordinary Camea's, whoſe white zones have any redneſs, yet it is not impoſſible but there may be, or may have been ſuch; but the reaſon of the author's bringing that ſtone in among theſe, is plainly this, that obſerving it a broad-vein'd, opake ſtone, and not properly to be ranked among the Onyxes, he placed it with one of its own kind, ſince the Romans had now determined to call a ſtone Sardonyx, which was plainly of the ſame kind with the Arabian Onyx, and differed from it only in colour.

Theſe ſeem to have been all the ſpecies of Onyxes and Camea's known to the antients, and all of which we plainly have to this day in the very places from whence they had them. I believe the ſame to be entirely the caſe, in regard to very many, nay perhaps all of their other Foſſils, which we, either for want of proper ſearches, or of properly underſtanding their works, judge to be loſt at preſent; ſince I believe there are no ſpecies of Foſſils of any kind, but that ſo many of them were at firſt created, that notwithſtanding they have no power of propagating their ſpecies, nor are there any new individuals of them formed ſince that time, yet there is no danger of our loſing any ſpecies of them that ever had being, any more than of a plant or animal.

There was ſcarce any ſtone of which the antients were more fond, for their more delicate uſes, than the Onyx. Rings, ſeals, vaſes, &c. ſo far as its ſize would allow, were continually made of it: And Mithridates is recorded to have had no leſs than two thouſand cups made of the various ſpecies of the Onyx Sardonyx, Chalcedony and other ſuch ſtones.

FOSSILS.

NATURALLY and eſſentially compound, not inflammable, nor ſoluble in water, formed in detatch'd maſſes, and compos'd of cryſtalline matter, debas'd by Earth,

Series the third.

CLASS III.

LITHIDIA.

FLINTY BODIES.

Stones of a conſiderably debaſed cryſtalline matter, covered by, and ſurrounded with an opake cruſt, and frequently of great beauty and conſiderable brightneſs, tho' of but a ſlight degree of tranſparence; approaching to the nature of the ſemipellucid Gems, and like them found in not very large maſſes.

Of this claſs there are two orders, and under thoſe, three genera.

Order the firſt.

Stones compoſed of cryſtalline matter, but ſlightly debaſed, and that ever by one and the ſame earth, tho' diffuſed in different degrees through them, and ever free from veins.

Order the ſecond.

Stones compoſed of a more debaſed cryſtalline matter, blended with different portions of differently colour'd earths.

Lithidia.

Order the firſt.

Of this order there is only one known Genus.

SILEX. *Flint. A ſemipellucid ſtone, debaſed by one peculiar Earth, of one ſimilar and equal ſubſtance, and free from veins.*

Lithidia.

Order the ſecond.

Genus 1. HOMOCHROA. *Stones compoſed of a cryſtalline matter, conſiderably debaſed by earth, and this of various kinds in the various ſpecies, but of only one in the ſame ſtone, and thence always of one plain and ſimple colour, and never ſubject to veins or other variegations.*

Genus 2. CALCULI. *Pebbles. Stones compoſed of a cryſtalline matter, debaſed by various earths in the ſame ſpecies; and hence ſubject to veins, clouds and other variegations: uſually formed by incruſtation round a central nucleus, but ſometimes the effect of one ſimple concretion, and veined like the Agates, by the diſpoſition the motion of the fluid they were formed in gave the different ſubſtances they were compoſed of.*

SERIES III.

CLASS III. ORDER I. GENUS I.

SILEX. FLINT.

A ſemipellucid ſtone, compoſed of Cryſtal, debaſed by a peculiar and appropriatea Earth, of a blackiſh grey, of one ſimilar and equal ſubſtance, and free from veins; but of different degrees of colour, according to the quantity of earth it contains, or to its different tinge; and naturally inveſted with a whitiſh cruſt.

NATURALISTS in general have accounted of various ſpecies of this ſtone, but erroneouſly. Nature has eſtabliſhed it into a Genus of itſelf, and allowed it no other ſpecies than one, which differs only in the degree, of the ſame colour and admixture. When the cryſtalline matter is either debaſed by earths of other colours, or veined or clouded with ſuch, it ceaſes to be pure, or proper Flint, and becomes a Pebble, an Agate, or an Onyx: and the not attending to this diſtinction of nature's eſtabliſhing, has made many Authors bring in the Engliſh, and other European Agates, and other ſuch ſtones, as well as a great number of genuine Pebbles, under the name of Flints.

The general diſtinction of Pebbles alſo hitherto eſtabliſh'd by Authors, as will be ſerved hereafter, is idle and unmeaning: flinty Pebbles, one of Dr. Woodward's great diſtinctions, is a term importing nothing, ſince all Pebbles are flinty, that is, all are compoſed, as Flint, of Cryſtal and Earth, and ſparry Pebble; his other great character, is abſurd, ſince there is no ſuch ſubſtance in nature as a Pebble containing Spar; thoſe, uſually ſo called, being only Cryſtal, with a great admixture of a white Earth.

The Pebbles and Flints of England are uſually inveſted with a cruſt of a different matter; thoſe of Germany are many of them ſo alſo; but more there than with us want theſe cruſts, and reſemble the Agates of the Eaſt-Indies.

Notwithſtanding, however, that we can properly acknowledge but one ſpecies of pure and proper Flint in the world, it may not be improper to obſerve, that this one ſpecies affects a thouſand varieties in its external figure, and ſcarce leſs in the ſtructure of its interior parts, tho' the ſubſtance ever remains the ſame in all. The endleſs varieties of the branchings of our Flints in ſome chalk pits, have led ſome idly to imagine, that they owed that ſhape to ſomething of a Coraline nature: others have pleaſed themſelves with the imaginary reſemblances they bear to horns, heads, feet, &c. of animals, and eſteemed thoſe ſhapes ſpecific, and ever attending the ſame ſort of Flint. Nothing however can be more erroneous than this, ſince the very ſame Flint which is found in all this variety of branching and figure, is almoſt conſtantly found in the ſame pits alſo, in very regular, orbicular figures, like cannon-ſhot, yet of the ſame colour, hardneſs and texture within, and covered with the ſame cruſt externally.

In our gravel-pits we alſo find Flint thrown into a thouſand irregular forms, frequently branched, very often hollow, and as often pierced with natural holes, running into the central cavity; or with three or four branches, each hollow all the way through, and having communication from their cavities with the larger central cavities within, looſe gravel, ſand, and other hard matter, getting through theſe external orifices into the central cavities of theſe ſtones, and being ſometimes too large to be ſhook out again, unleſs in the ſame direction, they got in, make theſe a kind of baſtard Ætites.

The Geodes, which has its name from its containing earth in the place of the central ſtony nucleus of the Ætites, and is uſually called the baſtard Eagle-ſtone, is alſo properly a variety of the Flint kind. Nothing is more frequent than for maſſes of Flint of various ſizes to have concreted round a central nucleus of the ſame Flint, highly debaſed with earth. This earth is of various kinds and colours, ſometimes the ſame with the debaſing earth, of the generality of the ſemipellucid ſtones, but more frequently it is a true and genuine Marle, and is either white, red or brown.

This Earth is not more various in its own nature alſo than in the degree of its admixture with the flinty matter that makes the central ſpot of theſe bodies; ſometimes it is but in ſmall proportion, and only gives a dead whiteneſs to the central part of the ſtone; ſometimes it is in ſomewhat larger quantity, and makes it rough, ſcabrous and cavernous; and at others is in ſo large a proportion, that the cryſtalline admixture with it, is not able to hold it together, but ſuffers it to fall into a looſe powder; and there are very frequently found parcels of it that even ſeem never to have had any Cryſtal or flinty matter mixed with them, and yet are lodged in the centers of the hardeſt maſſes of Flint. It is eaſy to conceive that theſe internal maſſes, tho' they filled up the ſpaces in their containing Flints, while moiſt, would in drying ſhrink almoſt to nothing, and leave cavities there; theſe we frequently find in Flints, and generally find them beautifully lined with Cryſtals, which have found means to form themſelves in all their purity from among the leſs pure matter of the maſs. It is not uncommon alſo to find Cylinders of pure Cryſtal, or more uſually of fine flinty matter, covered with minute Cryſtals, ſtanding acroſs theſe cavities; and theſe often adorned with a fine, thin line, or ſtring of the ſame pure Cryſtal or of Flint, covered with Cryſtal, very beautifully, and elegantly wound round them in ſpiral lines, from end to end, and affixed at each end to the common matter of the ſtone, or parietes of the cavity. Theſe are like the Botryoide bubbles in ſome ſpecies of Pebbles, hereafter to be deſcribed. The luxuriancy of nature throwing forth the matter of the ſtone in its pure and unmixed ſtate, wherever while yet ſoft, and not hardened into that perfect firmneſs it was hereafter to receive, there was room, and nothing to diſturb her in her operations. Theſe ſort of effervefcences are ever very elegant; and tho' theſe are lodged within only, and out of ſight till the ſtone is broken, there are not wanting frequently very beautiful configurations, even on the ſurface of ſome of the ſpecimens of this Foſſil. Wartlike protuberances, and punctula of elegant ſtructure, and in beautiful order, are frequently found on them; and theſe have led ſome even very good judges in many things, into the error of imagining, that ſome of them, which are truly natural, were owing to the impreſſions of marine bodies.

Silex vulgaris ſimplex.
Common ſimple Flint.

There is, perhaps, no ſubſtance more univerſally known than this, among us, nor produced in greater abundance. It is a ſtone of an extreamly fine, compact and firm texture, of a very uncertain ſurface, ſometimes perfectly ſmooth and equal, but more frequently rough, rugged, and protuberant; very various in ſize, many compleat nodules of it being of leſs than an inch, and many of two or three feet in diameter. In ſhape it is alſo the moſt irregular and uncertain of all ſtones: in our gravel-pits it frequently occurs in the ſhape of the ordinary Pebbles, roundiſh or ſlightly irregular: but in the chalk-pits, in which it is produced in greateſt abundance, it is extreamly various; ſome maſſes of it are ſmall, of one or two inches in diameter, and perfectly round; others of all imaginable variety of figures, oblong, roundiſh, branched, and reſembling the marine Corals, in a coarſe way, and full of multitudes of irregular protuberances. It is ever covered with a white external cruſt, ſometimes very thin, and in other ſpecimens, eſpecially the ſmaller, often $\frac{1}{6}$ of an inch, or more, in thickneſs. This is of a pure white, and is generally miſtaken for a chalky ſubſtance, eſpecially in the Flints that lie among Chalk; but ſo uncertain is the judgment to be formed by external appearance alone, that this cruſt has not the leaſt grain of chalk or any other alkaline ſubſtance in it, but is a pure, ſtony matter, compoſed of Cryſtal, debaſed by a very large admixture of a very white Earth, of the clay kind, probably a very pure, Pipe-earth, or white bole. Within this cruſt the ſubſtance of the ſtone is pure, uniform and equal. It is of all the degrees of grey, from nearly quite black, to almoſt quite white, and has naturally no ſpot, cloud or vein of any other colour, except that in ſome inſtances the matter of the coat or cruſt has got into it, and forms a few whitiſh ſpecks, more opake than the reſt. It breaks with a fine, even, gloſſy ſurface, and is moderately tranſparent, very hard, and capable of a fine poliſh.

It is well known to ſtrike fire with ſteel.

It makes not the leaſt effervefcence, either in its own matter, or in its cruſt, with Aqua Fortis.

It is well known to burn to whiteneſs.

The nodules of Flint are often ſolid, and often have cavities within, containing pure Cryſtal, or Chalk, Marle, or other Earths.

Examined by the Microſcope, it appears in thin pieces, ſcarce diſtinguiſhable from pure Cryſtal; its texture, brightneſs and the ſmoothneſs of its ſurface, all being juſt the ſame as in that ſubſtance. Its cruſt often appears a very beautiful object; being of a moſt pure, ſnow-white, of an irregular and rough ſurface, and, tho' perfectly opake, it has a great deal of brightneſs. This is ever pureſt in the globular maſſes found among Chalk, and has in theſe ſo much of a chalk look, that nothing but the teſt by Acids would convince one that it was not truly of that kind.

It is a Foſſil of great uſe, and found all over the world. With us it lies on the ſea-ſhores in great plenty, where it has been waſhed down from among the cliffs by the waves in ſtorms and high tides. We have it alſo very plentifully in our gravel-pits, but moſt abundantly in the chalk-pits in all parts of the kingdom, in which it forms ſtrata at different depths. Its uſes in glaſs-making, &c. are too well known to need a particular recital here.

It is not uncommon to find on our ſhores fine pellucid flinty bodies, ſtreaked or veined with white, black, brown, &c. Theſe are the Agates of this country, and anſwer in every particular, but fineneſs, to the Gem.

SERIES III.

CLASS III. ORDER II. GENUS I.

HOMOCHROA.

Stones compoſed of a cryſtalline matter, conſiderably debaſed by Earth; and this of various kinds in the different ſpecies; but ever of one kind only, in the ſame ſtone, which is thence always of one plain and ſimple colour, and never ſubject to veins or other variegations.

1. *Homochroum albicans.*
White Homochroum.

THIS is a plain, ſimple-colour'd ſtone, but is of an agreeable colour, and is not without its beauty. It is of a conſiderably fine and very even, ſmooth and compact texture, of a ſurface generally very ſmooth and equal in the whole, but furrowed all over with ſmall ſhallow wrinkles. It is generally of an orbicular, ſometimes of an oblong form, and frequently ſomewhat compreſſed. Its ſize is various and uncertain. Some ſpecimens are of leſs than half an inch diameter; but there are from this to ſix, ſeven or eight inches. It has no veins, ſtriæ, clouds, or other variegations, but is of one pure and equal ſubſtance and texture, and of one plain colour, which is a ſomewhat bluiſh white. It is indeed of various degrees of purity in the different ſpecimens, and variouſly bright and pellucid; ſometimes approaching to the white Carnelian, and at others to the common ground of the Agates. Its coat is ſometimes of a faint rediſh hue, but more frequently grey, or of a greyiſh-brown. It is generally ſolid, and even throughout its whole ſubſtance, but ſometimes has a cavity in its centre, lined with very beautiful ſhoots of pure Cryſtal. It is in general leſs tranſparent than many of the colour'd Pebbles.

It breaks with a fine, even, flinty ſurface, and is very hard, and capable of a fine poliſh.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to an opake, but very pure white.

Examined by the Microſcope, it appears of a good white, and moderately bright and pellucid, but of an irregular ſtructure, and looks, as it were, all over clouded with ſmall Moleculæ, or curdled throughout. Its original is doubtleſs no other than this, that a quantity of cryſtalline matter happened in its concretion, to take into its body a large quantity of a ſubtile white earth; it may be the Cryſtal alone would not in this inſtance have ſhot into an angular form, but remain'd a pebble Cryſtal, but even if it would otherwiſe have acquir'd its proper figure, it is not wonderful that ſo large an admixture of earth ſhou'd have prevented it, and determin'd it into a ſhapeleſs lump, which the motion of the fluid it was form'd in, would naturally roll into roundneſs; and the rolling-over earthy matter, while moiſt enough to make it adhere to it, give it the duſky and wrinkled coat it is ſeen to have, which muſt alſo neceſſarily be of different colour, according to the earth it owes its origin to.

This is common in many parts of England. I remember to have ſeen of it very beautiful about Peterborough in Northamptonſhire, and have frequently met with it on the hill beyond Deptford, among the vaſt quantity of other Pebbles there.

2. *Homochroum rubens.*
Red Homochroum.

This is another of the plain colour'd pebbles, which is not without its beauty. It is of a very fine, compact and firm texture, but of a leſs equal or regular ſurface than the former, being ſubject not only to the wrinkles ſo frequent in that, and thoſe generally alſo deeper and more numerous in this, but having frequently a number of prominences and cavities in different parts of it; it is generally of a pretty regularly orbicular form, and in ſize from one or much leſs, to two or three inches in diameter; there have been found much larger than this, but this ſeems the ordinary ſtint, very ſmall ones are alſo very common. It has naturally no veins, ſpots, clouds, ſtriæ or other variegations, nor ſeems like moſt of the common Pebbles to have had originally any central Nucleus, or to have been form'd by ſucceſſive additions of new matter in form of cruſts, but to have ow'd its origin to one ſimple coaleſcence. Its colour is very beautiful, and of very different degrees in the different ſpecimens, and ſometimes a little varying in the ſame, being ſomewhat paler in ſome parts than in others. It is ſubject alſo to be fouled by extraneous additions, and is often found to have a number of ſmall whitiſh and opake ſpots, and ſometimes has pieces of the next deſcrib'd ſpecies immers'd in it, which might at firſt ſight appear variegations in the ſtone, but they are in reality mere accidental foulneſſes; and as they happen very ſeldom to this ſtone, and might as eaſily happen to any other, they are not to be accounted as a particularity in the Species. This ſtone not only varies in the degree of its colour, but alſo greatly in its purity, ſome ſpecimens of it being greatly brighter and more tranſparent than others; in theſe different degrees of purity, and ſhades of colour, it approaches very much to the different Carnelians, and is often very little, if at all inferior to the ordinary ſpecimens of that ſtone. Its coat is uſually whitiſh, with a greater or leſs admixture of an aſh colour, and ſometimes of a yellowiſh brown. It is ſometimes hollow near the center, and has the cavity lin'd with elegant Cryſtals, but this is very rarely the caſe. It is in general of equal tranſparence with the finer kinds of the cruſted Pebbles.

It breaks with a fine, even, flinty ſurface, and is very hard, and capable of a fine poliſh.

It very freely and readily gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a much paler colour.

Examin'd by the Microſcope, it appears a very elegant, bright and pellucid ſtone, of a fine gloſſy ſurface, and extreamly of the true Cornelian hue, being of a much more ſmooth texture than the former, and almoſt entirely without that curdled look, which that and many other of the Pebbles have, from the imperfect admixture of their adulterating earth.

No ſpecies of Pebble is more frequent in our gravel pits than this; our lapidaries are better acquainted with it than they care to own, and many of the ſeals ſold for Cornelian are in reality made of it. I have ſeen alſo buttons of it, and when the finer pieces are choſen they make a very beautiful appearance.

3. *Homochroum flaveſcens.*
Yellow Homochroum.

This is a very pure and bright ſtone. It is of a very fine, ſmooth and even texture, extreamly firm and compact, and of a rough, irregular ſurface, having uſually many inequalities, prominences and cavities, beſide the wrinkles ſo common and almoſt univerſal in the coats of theſe ſtones. It is of a leſs regular ſhape than either of the former, ſometimes indeed it affects a tendency to an orbicular form, but more uſually is perfectly rugged and irregular; its ſize is very various, but it is generally found large, ſix or ſeven inches diameter being no uncommon ſize with it, tho' it is frequently found alſo of leſs than an inch; it is like the other plain Pebbles, free from all admixture of other colours, having no ſpot, line, cruſt or other variegation, and ſeeming like thoſe not originally form'd by the addition of freſh matter, in form of cruſts round a central Nucleus, but by one general concretion made at once, and ſubject to no additions or alterations afterwards; its only variation being in degree of colour and tranſparence. I have elſewhere obſerv'd, that tho' theſe ſtones are compos'd of Cryſtal and earth, it is not the earth that originally debaſes the Cryſtalline nodule into a Pebble form, to which it owes its colour, nor does the colouring earth in other words ever light upon pure Cryſtal in this caſe, as far as can be obſerv'd in theſe obſcure and abſtruſe reſearches, and by that means form the ſtone; but that there is one general adulterating matter, that changes Cryſtal into Pebble or Flint, one and the ſame ſubtile earth affects this change in all theſe ſtones, and makes pure Cryſtal the baſis of them, but the various colours are the addition of freſh earth afterwards: 'tis ſeldom this baſis or ground of the Pebble Claſs, is found free from other admixtures and pure; in the ordinary white Pebble firſt deſcrib'd, it is not at all ſo, that contains as much of a white earth beſide, as this of the yellow, or the former of a red; if it is any where ſeen unmixed with other earth, however, it is in the purer Flints, and ſometimes in ſome parts of the more pellucid ſpecimens of the white Pebble. The variations in the degree of colour in this yellow kind, are principally owing to the different degree in which the yellow earth, to which it owes its preſent colour, is mix'd with the grey maſs it originally was; this in the different ſpecimens, and often in the different parts of the ſame ſpecimen is extreamly various, ſometimes tho' rarely we find whole ſpecimens, or parts of them of a fine, ſtrong or deep yellow, but very frequently we meet with the contrary accident; the yellow earth mix'd in ſo ſmall a quantity with the maſs, as to leave the original whitiſh grey very plainly diſtinguiſhable. As the other ſpecies approach to the white and the red Cornelian, ſo does this extreamly to the yellow; it is indeed often equal to the fineſt ſtones of that kind. It is generally plain and ſolid throughout, very rarely foul or hollow at the center, but frequently full of a multitude of imperceptible flaws, which make it ſhatter and fly into irregular ſmall pieces when broken; its cruſt is uſually white and much of a chalky hue.

It breaks with an extreamly fine, ſmooth and gloſſy ſurface, and is more tranſparent than either of the former, and very hard, and capable of an elegant poliſh.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis, neither in its ſtoney part, nor in its cruſt; the chalk-like appearance of which might make a young ſtudent in theſe things very apt to think it wou'd.

It burns to a pure white.

Examin'd by the Microſcope, it appears of a very elegant and fine texture, leſs curdled or clouded with its earth than moſt other ſpecies, and by its equal and regular diffuſion thro' the maſs is made much to emulate the texture and conſtitution of the Agates.

It is not a very common ſpecies, but is ſometimes found about London. I have ſeen ſome few ſpecimens of it on Hampſtead-Heath, one of which having a number of elegant, tubular and branch'd Coralloide bodies in it, is much like what our lapidaries call the feather ſtone, and is indeed one of the moſt elegant ſtones I have ſeen of the kind.

4. *Homochroum ſubcæruleum.*
Blueiſh Homochroum.

This is a more impure and leſs elegant Pebble than any of the former; it is of a moderately compact, ſmooth and cloſe texture, of a rude, irregular and much wrinkled ſurface, and very uncertain in ſhape and figure, being ſometimes roundiſh, ſometimes oblong, but oftner of an unequal and protuberant ſhape; its general ſize is about two inches in diameter, but is often found much exceeding this, or much ſmaller; it is not often found ſo pure and ſimply colour'd as the former ſpecies, but when it is, is of a ſomewhat duſky lead colour, or impure blue; this may be eſteem'd its proper appearance and moſt perfect ſtate, but this it is but ſeldom found in, it being tho' when its ſubſtance is thus perfectly blended of one ſimple colour, yet really of two, a duſky blue, and very opake white, the moſt uſual ſtate we find it in is with theſe colours a little got looſe from one another: it is uſually of different degrees of blue in its different parts, in ſome deep, and in others approaching to white, but is very frequently alſo ſeen with the two colours more ſeparated, the whitiſh appearing almoſt diſengaged from the blue, and making a thouſand oddly figur'd clouds, ſpots and ſhort lines on it; this is the effect of the diſunion of the two ſubſtances which go to compoſe the proper colour of this ſpecies, and in this ſtate it is moſt ordinarily found; it is, however, ſubject to no other adulteration, or mixture of colour, nor have I ever ſeen a ſingle inſtance of the white in this making any thing like regular lines, veins, or cruſts, or ſeeming as if an additional matter thrown into the compoſition of another ſtone, but ever as a true and genuine part of it, in ſome degree looſe and diſingag'd from the reſt, and ever rendering the ſtone the worſe by being ſo; this is generally perfectly ſolid to its center, free from cavities, and from thoſe imperceptible cracks to which the former ſpecies and many others are ſo ſubject. Its cruſt, or outer coat is very various in colour, ordinarily it is white and chalk-like in appearance, but ſometimes it is of a blueiſh brown, and ſometimes very thick and yellow; the ſtone is leſs pellucid than moſt of the other plain Pebbles, it breaks however with a ſmooth and even ſurface.

It is conſiderably hard, and capable of a good poliſh.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a whitiſh grey.

Examin'd by the Microſcope, it appears bright and gloſſy, but very clouded and opake, and moſt ſo in the whiteſt parts, and leaſt of all in thoſe blue ones, from which one may ſee the white has diſingag'd itſelf, and in ſome meaſure got out; it is indeed a very general obſervation, that none of all the adulterating earths render the ſtone ſo opake as the white.

It is very common in all our gravel pits about London, and elſewhere.

5. *Homochroum vireſcens.*
Greeniſh Homochroum.

This is a very ſoul and opake Pebble, but for the ſingularity of its colour is very remarkable, and generally ſtrikes the eye wherever one happens to meet with it. It is of a moderately compact and cloſe texture, but leſs fine than many of the common ſpecies; of a pretty ſmooth and even ſurface, having generally but few, and thoſe but ſlight wrinkles, and ſeldom any prominencies or cavities about it. It is generally of an orbicular or oblong figure, and varies in ſize from half an inch to two inches in diameter, beyond which it is ſeldom found. It is ever abſolutely free from all foreign admixture of colour, and has neither ſpot, cloud, or vein of any, nor the leaſt variation either in different ſtones, or the different parts of the ſame ſpecimen, except in the degree of tinge. Its colour is a deep duſky, and ſomewhat blueiſh green. It has more or leſs of the blue caſt in the different ſpecimens, and is often rather blueiſh than green, tho' ſometimes of a pure jaſper colour'd green, and without all ſign of blue in it; it is but of a coarſe look, and is plainly extreamly loaded with earth; its coat is generally thick and white, but ſometimes of a duſky blueiſh grey, and as thin as uſually in the other Pebbles; it is leſs tranſparent in general than moſt others, but breaks with a fine, even, and ſomewhat bright ſurface and is very hard, and capable of an elegant poliſh.

It very freely gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It burns to a duſky browniſh grey.

Examin'd by the Microſcope, it appears gloſſy, but very opake, of an extreamly curdled or clouded ſurface; and tho' the colour appears very equally ſpread to the naked eye, yet thus examin'd in a piece thin enough to be a little tranſparent, one plainly diſtinguiſhes the colouring earth, not ſpread or diffus'd equally thro' it, but lodg'd in millons of little diſunited Moleculæ, like the red earth in the German Sardonyxes, and the earths in many other of the leſs pure ſtones.

It is a very rare ſpecies, I have not ſeen it more than three or four times, and never yet in the neighbourhood of London; the gravel pits of Northamptonſhire afford now and then a ſpecimen of it, but the moſt probable place to meet with it is on the ſhores; about Bognor Rocks in Suſſex, I have ſometimes ſeen it, and oftener on the ſhores of Yorkſhire.

Theſe are the five plain colour'd Pebbles, which are in themſelves diſtinct ſpecies, not the accidental varieties of others, or ſubject to any great variation in themſelves; the common blending of the colours of the naturally vein'd and cruſted Pebbles, produces maſſes ſometimes ſomewhat like theſe, and often very different and eaſy to be miſtaken for genuine ſpecies; a long courſe of obſervation, and diligent examinations of the ſubſtances themſelves, are the only ſure ways to avoid error, and on theſe principles only is this work founded.

SERIES III.

CLASS III. ORDER II. GENUS II.

CALCULI. PEBBLES.

Stones compos'd of cryſtalline matter, conſiderably debas'd by earths, and thoſe of various kinds in the ſame ſpecies; and hence ſubject to veins, clouds, and other variegations: uſually form'd by incruſtation round a central Nucleus, but ſometimes the effect of one ſimple concretion, and vein'd like the Agates, by the diſpoſition the motion of the fluid they were form'd in, gave them differently colour'd ſubſtances.

If there was ſome difficulty in reducing the almoſt infinite variety of the Agates to any certain ſpecies, the taſk is here yet more intricate and perplexing; the variety of the Pebbles, were it of England alone, is ſo great, that a haſty deſcriber would be apt to make almoſt as many ſpecies as he ſaw ſpecimens; a careful examination of them, however, according to the Rules before obſerv'd in regard to Agates, will teach us to diſtinguiſh varieties purely accidental from diſtinct ſpecies; and when we find the ſame colours and ſame ſubſtances in the variegation of a number of ſtones, we ſhall eaſily determine all theſe to be of the ſame ſpecies, whether the matter be diſpos'd in one, two, or twenty cruſts, or blended abſolutely among the cryſtalline or flinty baſis of the ſtone ſo as to make one uniform maſs; or diffus'd without this equal mixture in form of irregular lines.

It is to be obſerv'd of the Pebbles in general as before of the Agates, that there ſeems in them all one primary debaſing matter of the Cryſtal, that is the baſis of them; and that this is by a peculiar and appropriated earth, which is ever the ſame in all, whether it be diſtinguiſhable in different places from the abſence of the other after added colours, or whether it be wholly hid and bury'd by them.

This earth alone makes the general baſis of Pebbles the true genuine Flint before deſcrib'd in its pure ſtate, and the matter that alters it from Flint to Pebble, is a ſuperadded ſubſtance, ſometimes a mineral tinge only, but generally a colour'd earth; this gives them their veins, lines, cruſts, &c. by its admixture with Cryſtal into a maſs like themſelves; and afterwards is added to them, and according to the quantity they have of it, they are either thro' the whole maſs or in part more or leſs opake.

If I can be ſo happy to convey the diſtinctions between the really different ſpecies of Pebble, and the real and original ſameneſs between the varieties of them, as ſtrongly and clearly in words, as they are made to ſtrike the eye only in the ſmall collection I have got together *of them, I flatter myſelf that the great work of arranging them, and aſcertaining the number and characters of the diſtinct pieces, which at firſt view, either of nature's ſelf, or of the authors who have treated of them, muſt ſeem a diſheartening, and even impracticable taſk, will be gone thro' in a clear and determinate manner; and that the ſtudent in theſe ſubjects will hereafter know, that inſtead of the ſuppos'd infinite variety of ſpecies in this Genus of Foſſils, there is only a determinate, and that in compariſon of what might have been expected on a more ſlight view, but a very ſmall number of them, to which all the reſt may be refer'd; and from an obſervation of the operations of nature in other parts of the Foſſile world the origin of their variations aſſign'd.*

All things appear difficult till they are regularly undertaken; and in this attempt obſerſervation and compariſon alone will be ſufficient to enable any one to trace the ſteps I have trod, in examining and reducing the varieties hitherto known, to the ſpecies as yet aſcertain'd, and to conſtitute new ſpecies, if any thing truly new occurs, which has eſcaped my obſervation, or to reconcile to their proper ſpecies already eſtabliſh'd, varieties I may not have ſeen.

Things very numerous, ever appear to a careleſs examination much more ſo than they really are. The ignorant critick has ever laugh'd at the ſtory of the ark's containing the ſpecies of all the animals in the world, imagining thoſe ſpecies numberleſs; while the judicious naturaliſt, who well knows what are the real number of the ſpecies in the animal world, traces with ſatisfaction the accounts of the divine admeaſurement, and finds the veſſel capable of holding all it was to contain, with eaſe and ſatisfaction to themſelves. The ſtars in the heavens are well known to have been imagin'd like the ſpecies of animals in this inſtance, much more numerous alſo than they really are, and the imperfection of our minds in this, as in all other inſtances, leads us, at firſt view, to call a large number innumerable.

The ſight of a heap of Pebbles, the produce only of one gravel pit, would lead the curſory obſerver, on examining their various ſtructure, to imagine the ſpecies, even here alone, innumerable; while truth and accurate obſervation would be able to reduce them according to nature's laws, and to bring the things themſelves into a very few really diſtinct kinds.

If a ſlight obſervation of nature's ſelf would lead us into an error of this kind, the accounts of authors, who have not ſufficiently obſerv'd or examin'd into nature, would much more do ſo; the moſt reputed of the moderns for the accuracy of his diſtinctions, the late Dr. Woodward, has given us, in his catalogue, no leſs than the number of four hundred and upwards in his ſeveral aſſortments and additions; and one would imagine from this, as well as from ſome of our moſt celebrated collections, in this and other things, that many volumes in folio muſt be employ'd in giving the names of ſome of theſe collections alone, or but the hiſtory of one diſtinct Genus.

It may not be improper to obſerve, once for all, that hiſtories of ſuch a kind would be not leſs tedious than trifling, and of no more uſe to ſcience than ſuch collections; the deſign of writing ſhould be to convey knowledge, and knowledge of theſe things can conſiſt alone in the reconciling varieties, and determining the characters of ſpecies, which knowledge can be no other way convey'd than by accurate deſcriptions founded on true diſtinctions. What a numbers of ſuperfluous nothings, in regard to ſcience, would a regulation eſtabliſh'd on theſe principles, either throw out of our collections, or at leaſt reduce to one name; nor would its effect be leſs in regard to the numbers deſcrib'd in books. The deſcriptions of Dr. Woodward, imperfect as they are, are ſufficient to convince us that his four hundred ſpecimens might be very juſtly reduced, perhaps to a fourth part of one hundred ſpecies; the author himſelf was ſenſible enough of this, and has thrown out many from his accounts at leaſt, if not from his collection; and what numbers more would the more accurate diſtinguiſher baniſh from the account, who finds him, beſide the moſt evidently ſlight varieties given as different ſtones, giving us, under different numbers, the ſame ſtone in the maſs; and at the diſtance of a page or two, a fragment broken from it, or a poliſh'd plate cut off of it; the attending to the author's own accounts, will ſhew, even the leſs curious reader, that the number might have been much reduced in this Genus, had not pomp and oſtentation been much more ſtudied in it than the advancement of ſcience or true knowledge; but if this be the caſe with the leſs accurate obſerver, what what will be the reduction of the cloſe obſerver of nature, who will find bodies of very different nature, ſtructure, and claſſes, rang'd among theſe, and filling up the account. The Cementæ, commonly call'd Pudden ſtones, properly of a different Genus, make up a large part of the firſt pages, and the ſeveral Pebbles they contain, deſcrib'd in their ſeparate ſtate afterwards, with their accidental *varieties, take up four times the room and numbers they ought to do. Pebble cryſtal, becauſe often orbicular in form, is rang'd among theſe alſo. Flint and the Agates, and other ſemi-pellucid Gems, to which he has allow'd no proper Genus, confuſe alſo, and ſwell up the account; and beſide all theſe, the ſame Pebble is deſcrib'd in one place plain, and in another mark'd with ſtreaks, as they are call'd; which every one, who has look'd into nature with any degree of care, muſt be amaz'd, that the author did not know to be extraneous bodies of the Coral kind, accidentally lodg'd in the ſtone; and no more altering its nature, than the ſhells in clay pits the ſtratum in which they are bury'd. Another conſiderable addition to this claſs is alſo from ſmall maſſes of ſtone broken from ſtrata of different kinds, and properly reducible to that claſs, and to their ſeveral ſpecies, with great eaſe, by an ordinary inſpector, on compariſon of their ſtructure when broken, with that of the ſeveral ſtones or ſtrata.*

With theſe, and many other additions like theſe, it is no wonder, that a catalogue of ſpecimens of Pebbles might be brought up to a larger number than even this author's book, or the moſt numerous collection among us at preſent amounts to; and without theſe, how greatly muſt they be reduc'd! and how ſmall, in compariſon of this, muſt be the number allow'd by the perſon, whoſe buſineſs it is to reduce varieties to their proper ſpecies, and deſcribe in other places, and in their proper genera, all the ſtones not properly Pebbles, which are there call'd ſo.

On theſe principles the reader will not wonder to find the Pebbles of the whole world, as far as they have hitherto come to our knowledge, here included in no great number of ſpecies, tho' Dr. Woodward alone accounted he had four hundred. Far be it from me to cenſure that excellent writer, notwithſtanding all his faults, either thro' the ill natur'd and diſhoneſt pleaſure of degrading others, or the pride of improving on him; what I am oblig'd, in conſequence of my own attempt, to obſerve in regard to the errors of ſome parts of his writings, juſtice to myſelf will not permit me to omit. The world, who have very deſervedly a great eſteem for what he has left us, would naturally wonder at the great difference in our accounts of the ſame things, unleſs it were explain'd why we differ, and ſo far alone ſhall I be found touching upon his errors, elſewhere it will ever be my pleaſure to allow him the honour he deſerves.

The natural formation of Pebbles, is by incruſtation from the additions of freſh matter, at different times, in form of ſo many coats round a firſt form'd central Nucleus; but if the ſame matter be diſpos'd in a different order, or even if the Nucleus appear wanting, by its being blended among the other matter of the ſtone, we are not to call the ſtone a different ſpecies for that reaſon; but a variety only of that which, in other inſtances, we find with a Nucleus, and form'd of cruſts; the abſence of the Nucleus indeed, in its proper form, is the great reaſon of all this variation, ſince the ſame matter which, by being diſpos'd regularly round it, would have form'd cruſts, or concentric circles, muſt, when it has no ſuch fix'd point to be form'd upon, either abſolutely blend together into one maſs of a mix'd colour, or be ſubject to the ſame laws with the matter of the Agates, and have its variegations diſpos'd in the ſame order: And thus we ſee the variegated Pebble without Nuclei ever without the regularity of the concentric circles alſo, and ever emulating the ſtructure of the Agates.

1. *Calculus griſeo flaveſcens, cruſta albido ſubcærulea.*
Yellowiſh grey Pebble, with a blueiſh white cruſt.

THIS is of an extreamly pure, fine, cloſe and compact texture, of a tolerably regular and equal, but wrinkled ſurface, generally approaching to an orbicular or oblong figure, and in ſize, from one to four, five, or ſix inches in diameter; it is uſually compos'd of a very large central Nucleus enclos'd in one broad cruſt, and that cover'd with a very thin coat. Its Nucleus is of a greyiſh yellow; theſe colours ſometimes are very equally and perfectly blended, and make a plain third colour between them, but more frequently they are irregularly mix'd in form of clouds, or large ſpots, either of yellow in the grey, which is moſt uſual, or ſometimes of grey in the yellow; and often there are whitiſh opake ſpots diſpers'd here and there viſible among them; the ſubſtance of this Nucleus very nearly approaches to the nature of pure Flint, differing from it indeed in nothing but the addition of the yellow earth that makes the variegation, and where it is free from it appearing plain and pure Flint; the cruſt including this, is of a blueiſh white, and of a ſomewhat coarſer texture, being more debas'd by earth; this is uſually a ſimple and equally mix'd maſs, and the external coat which is full of wrinkly and long cavities, and is of a whiter colour, is no other than the ſubſtance of the other cruſt with an admixture of the very earth, which with Cryſtal alone makes the pure white coat of the ordinary pure Flint.

This is the uſual appearance of this ſpecies, but is not unfrequently ſeen with all the colours blended into one maſs, or with three, four, or five cruſts, inſtead of a ſingle one; the yellow is alſo ſometimes diſpos'd in irregular veins, and the Nucleus left nearly pure without it; all theſe varieties the judicious obſerver will, however, eaſily reduce to the ſame ſpecies, when he finds they are only owing to the different diſtributions of the ſame ſubſtances.

It breaks with a fine, ſmooth and gloſſy ſurface, and is conſiderably tranſparent in its Nucleus, but much leſs ſo in its cruſts.

It is of great hardneſs, and capable of a very elegant poliſh.

It very freely gives fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

In the fire it burns to a pale grey.

Examin'd by the Microſcope, it appears a Cryſtal differently debas'd in the different parts, but every where bright and gloſſy. It is very frequent in the gravel pits of Northamptonſhire, and is ſometimes found about London: In the gravel pits between Tyburn and Paddington, I have ſometimes ſeen fair ſpecimens of it.

It is of too little variety of colour to be of any value among the lapidaries.

2. *Calculus nucleo flavo, cruſtis albidogriſeis & rubentibus.* *Yellow center'd Pebble, with whitiſh grey, and reddiſh cruſts.*

This is a Pebble of more beauty than the former, but greatly inferior to many hereafter to be deſcrib'd; it is of a moderately fine, compact, and cloſe texture, of a regular and equal ſurface, but generally much wrinkled; ever approaching to an orbicular form tho' generally pretty much flatted, and in ſize uſually of about three inches diameter, tho' often much ſmaller, and ſometimes conſiderably large: it is compos'd of a large central Nucleus like that of the former ſpecies, taking up the greateſt part of the ſtone, and generally of a pretty regularly determinate figure, round or oval, with even edges; this is of a ſtrong good yellow, very bright, and moderately tranſparent, and is often quite pure and ſimple in itſelf, but ſometimes mark'd with more opake whitiſh ſpots; theſe are nearly circular in figure, and from the bigneſs of a pins head to that of a pea; this Nucleus is immediately ſurrounded by a cruſt or circle of a pale greyiſh white plain flinty matter, ſometimes neatly and regularly circumſcribing its edges, but often running into it, and receiving the matter of the Nucleus into itſelf in form of clouds, and making an irregular and broader undulated line; this is generally ſucceeded and cover'd by a narrow circle of a pale but not diſagreeable red, and that by the external coat of a pale whitiſh colour, and compos'd only of the matter of the outer cruſt with an admixture of more earth; this is the general diſpoſition of the central matter and circular cruſts of this ſtone; it is often varied however, by the blending of the red and white cruſts into one broader, and of an obſcure reddiſh grey; not unfrequently alſo the cruſts are more numerous, and ſometimes ſeparated by one or more of the ſame colour and ſubſtance with that of the Nucleus, and like the other Pebbles, its variouſly colour'd matter, inſtead of being thus regularly diſpos'd, is ſometimes found all blended into one maſs, and affording us only a plain yellow Pebble.

It breaks with a ſmooth, even and gloſſy ſurface.

It is moderately tranſparent, and hard enough to take a good poliſh.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a pale but duſky red.

Examin'd by the Microſcope, its whitiſh veins appear very little different from pure Cryſtal; its red are very elegant, and have much of the colour of ſome of the Cornelians, and its yellow part, or Nucleus, is more opake and leſs bright than any other except the whitiſh ſpots it is mark'd with; for theſe on a nice inſpection appear extreamly dark and coarſe, and ſeem to be the very ſame matter that forms the outer wrinkled coat.

It is very common in the gravel pits on Hampſtead-Heath, at Kenſington, in Hyde-Park, and moſt other places; it is not of beauty enough to tempt the lapidaries to meddle with it.

3. *Calculus nucleo fulvo, cruſtis albis, nigris, fuſcis, & pallide flaveſcentibus.*

Yellow center'd Pebble, with white, black, brown and ſtraw colour'd cruſts.

This is a very elegant and beautiful ſtone; it is of an extreamly fine, compact and cloſe texture, of a regular and equal but much wrinkled ſurface, generally of an orbicular or oval ſhape, and ſeldom exceeding two or three inches in diameter. It is compos'd of a large central Nucleus, taking up the greater part of the maſs, and ſurrounded by a number of very elegant cruſts, much reſembling the Zones of the Onyxes; the Nucleus is of an extreamly fine texture, very bright, tolerably pellucid, and of a ſtrong but not bright yellow; it is ſometimes equally colour'd throughout, and pure, ſometimes made up of clouds of yellow and flint colour, ſometimes ſpotted as the before deſcrib'd, with opake ſpecks of a pale whitiſh colour, and ſometimes has its central part in form of pure, pellucid, colourleſs Cryſtal; and this not diſpos'd round the edges of a central cavity in ſmall angular ſhoots, as is common in many Pebbles, but one ſolid equal piece of the bigneſs of a common ſmall nutmeg; the central Nucleus in this ſpecies, is generally ſurrounded with a thin but very elegant black circular line, that is cover'd by a cruſt of a paler yellow than the Nucleus, that by a third of a pure but opake white, that by one of a pale brown, and theſe by four or five other of the ſame colours rang'd alternately, and not unaptly reſembling the Zones of the Onyx; theſe are all cover'd by a coat ſometimes blueiſh, ſometimes whitiſh, but always much wrinkled; the black veins or cruſts in this ſtone, are of a fine gloſs and tranſparence, the reſt more opake and earthy; this is the uſual appearance of this elegant Pebble, but like the reſt, it varies into an irregularly vein'd maſs, ſometimes into a plain ſimple yellow ſtone, and often wants ſome of the colours ſingle of its cruſts from two or more of them blending together.

It breaks with a fine, even, gloſſy ſurface, and is moderately tranſparent, very hard, and capable of an elegant poliſh.

It very freely gives fire with ſteel.

It will not at all effervesce with Aqua Fortis.

It burns to a pale reddiſh white.

Examin'd by the Microſcope, is affords a very pleaſing variety; the Nucleus is very fairly tranſparent and very bright, the black veins appear of a true, fine black, and more tranſparent than this, and the others much more opake; eſpecially the white ones which ſeem much of the nature of the cruſts of theſe ſtones; it is very evident that this and moſt of our other Pebbles have been form'd by a primary concretion of cryſtalline matter, prevented from ſhooting into an angular figure: but the extraneous earthly matter it contain'd, round which freſh matter having been continually applied in ſmall quantities, has form'd theſe lines or cruſts of various colours. Where the firſt concreted matter has been ſufficiently hardened before a freſh quantity was apply'd to it for the forming another cruſt, the edges or commiſſures of theſe have been left regularly circumſcrib'd and even, as is commonly the caſe in this ſpecies; where they have been lodg'd upon one another while both were ſoft, if greatly ſo, they blend abſolutely together, and form but one Zone of a mix'd colour; if leſs ſo, they run into one another as is common in the former ſpecies, and make an irregular undulated line.

This is common on Hampſtead Heath.

4. *Calculus hebes, nucleo fuſco, cruſtis albidis, fuſcis & ſubcæruleis.*

Dull, brown center'd Pebble, with whitiſh, blueiſh and brown cruſts.

This is generally a very regularly conſtructed ſtone; it is of a cloſe, compact and firm texture, of an equal and regular but wrinkled ſurface, generally of a roundiſh or oval ſhape, and ſomewhat flatted, and in ſize from one to four or five inches in diameter. It is compos'd of a moderately large central Nucleus, of an agreeable but ſomewhat deep brown, of a moderately fine texture, but leſs tranſparent, and of leſs brightneſs than many of the other Pebbles; this is generally ſurrounded, firſt by a broad whitiſh circle or cruſt, that is next ſucceeded by a narrower of the ſame brown with the Nucleus, that by a third of the ſame ſubſtance with the inner circle, and finally, this by one of a blueiſh colour, and much more pure flinty texture than any other part of the ſtone, over this is the coat of the ſtone made as in the reſt, of the matter of the outer cruſt with an admixture of earth; the Nucleus in this ſpecies is of a coarſer texture than in many others, and contains more earth; it is, however, generally free from thoſe opake whitiſh ſpecks that foul the Nuclei of the finer ſpecies. Very frequently the whitiſh cruſts or circles, eſpecially the inner one, are of a ſomewhat coarſer texture than this, and very opake and dull, the outer blue one is tolerably tranſparent; this is the general face of the ſtone, but it is ſubject to great varieties, its outer white cruſt is frequently ſeen blended in great part, or entirely with the blueiſh one, in which caſe the blue is entirely loſt, and we have one broad circle of a finer and brighter white maſs, with very little change of colour for the blue; its other veins in like manner often run into one another, and ſometimes the whole matter of the ſtone is blended into one pale brown maſs.

It breaks with a tolerably even, but not very bright or gloſſy ſurface.

It is conſiderably hard, and capable of a good poliſh.

It pretty freely gives fire with ſteel, tho' leſs readily than thoſe ſpecies which have more pure Cryſtal, or leſs earth in them.

It will not at all ferment with Aqua Fortis.

It burns to a duſky red in the Nucleus, and to a white in the other parts.

Examin'd by the Microſcope, it appears of a more rough and rugged texture than any other of this claſs, and leſs bright or tranſparent than moſt of them; its brown parts diſcover a little caſt of reddiſhneſs if attentively examin'd, and its outer coat is very different from the reſt, being almoſt entirely made up of pure flint, and very tranſparent.

It is common on Hampſtead-Heath, about Iſlington, and in moſt other of the gravel pits in the neighbourhood of London, and elſewhere.

Among the other varieties of this Pebble, it muſt by no means be omitted that one of them is, its being found with its Nucleus looſe, and ratling in it when ſhaken; and in this ſtate it is the famous Ætites or Eagle-ſtone, ſo celebrated for its imaginary virtue, and generally eſteem'd a peculiar ſpecies of Foſſil: It is indeed ſo far from being ſuch, that it is not even a conſtant variety of the ſame ſpecies of Pebble; many of the ſpecies are at times found varying into it, but this moſt frequently, as its ſtructure moſt eaſily ſubjects it to it.

The plain hiſtory of this remarkable Foſſil is this: It is no other than a diſtemper'd Pebble, if I may be allow'd the expreſſion, uſually of this ſpecies; the central Nucleus of this I have obſerv'd in its deſcription, is coarſer than that of many, nay, of moſt of the other Pebbles; that is, it is compos'd of more earth and leſs Cryſtal; the natural conſequence of this muſt be, that being of a more looſe and rare texture, it muſt in drying be more apt to ſhrink than ſuch as were purer, more compact, and nearly of the ſubſtance of pure Cryſtal as many of them are; the whitiſh cruſt, that in this ſpecies immediately ſurrounds this central Nucleus, is, as I have alſo before obſerv'd, of a yet coarſer texture than the Nucleus itſelf; that is, of a more looſe ſtructure, more ſubject to ſhrink in drying even than the Nucleus itſelf, and being compos'd of more earth and leſs Cryſtal than that, muſt alſo be thence more ſoft and friable; the outer circles or cruſts of thus ſpecies we ever find are much harder than theſe; let us now conſider, what may eaſily be the effects of this ſtructure, which is evidently and conſtantly the ſtructure of this ſpecies, and we ſhall find that an Eagle-ſtone, or a Pebble with a detach'd and looſe Nucleus, after the ſtone has in ſome degree acquir'd its hardneſs, will be very naturally the conſequence, whenever the earthy matter in the Nucleus and firſt cruſt exceeds but a little its uſual proportion. The Nucleus will in this caſe, from the draining off, evaporating, or otherway ſeparating its fluid, or watery part, begin to ſhrink up and contract itſelf into a ſmaller ſize; in doing this it cannot but ſeparate itſelf every way from its containing cruſt, which it barely touch'd before, thus it becomes looſe; the cavity, however, between it and its cruſt made by this alone, could be only very ſmall; but we are to conſider, that the inner cruſt being yet more coarſe and earthy, and of a more lax ſtructure even than this Nucleus, muſt contract and ſhrink alſo; this being already detach'd from the Nucleus, but cohering firmly to its inveſtient cruſt behind, can therefore ſhrink only backwards, that is from the Nucleus, and toward its covering; the plain conſequence of this is, the leaving a much larger ſpace for the Nucleus, and giving it room to rattle as we find it; but this is not all; the water departing from off the earth at the end of the univerſal deluge, muſt have had great power, and certainly has in reality done many things, tho' not all that Dr. Woodward has attributed to it. The reader will allow me, I flatter myſelf, that ſuppoſing, as muſt naturally have been the caſe, the Pebbles, &c. to have been form'd in it before that time, nothing could be ſo ſubject to its force, nor any bodies roll'd and toſs'd about ſo violently by it as the ſmaller Nodules, and of theſe none more than the hard and roundiſh Pebbles: of this we have indeed many undeniable evidences, among which none is greater than this, tho' ſome are more evident, as the ſmoothing the ſurfaces of what we call the Pudden ſtones, the Cementæ before deſcrib'd, the natural ſurfaces of which muſt neceſſarily have been the moſt rugged of thoſe of all Foſſils, from the irregular prominency of the ſeveral ſmall Pebbles contain'd in them; yet this ſurface is frequently in the gravel pits of Hertfordſhire, eſpecially in the ſmaller ſpecimens found quite ſmooth, and all the Pebbles worn down even, as if cut off by art: this is one great proof of the force of that vaſt body of water in departing; another is, that the Pebbles in the deepeſt pits are frequently found naturally broken, and in halves, which could have happen'd only in that place, and by means of their being daſh'd together at that time; but this Pebble, in its Ætites form, is a yet greater proof, for when broken we frequently find that the Callimus, for ſo the Nucleus now looſe is call'd, has, by means of this motion, beat off all the ſubſtance of the inner cruſt, and reduc'd it to a whitiſh powder, in which it lies half bury'd, and has a large cavity to rattle in. Many of the Ætitæ in this ſtate have been naturally broken, and waſh'd about ſince, ſo that we frequently find only the ſingle and empty halves of them.

5. *Calculus ſplendidus, nucleo fuſco, majori, cruſtis albis & fuſcis.*
Shining, brown center'd Pebble, with white and brown cruſts.

This is a very elegant and beautiful ſtone, and tho' it takes in only two colours, yet has thoſe both ſo beautiful and pure, and is of ſo elegant a ſtructure, as to be inferior to few of the Pebble Genus; it is of an extremely fine, cloſe, and compact texture, of the common wrinkled ſurface of Pebbles, of an orbicular or oval form, but generally ſomething flatted, and frequently of four or five inches in diameter; it is compos'd of a very large oblong central Nucleus, of a deep, but yet bright and agreeable brown, of an extremely fine texture, very bright and tranſparent, but ſubject, at times, to the whitiſh ſpecks ſo common in the larger Nuclei of Pebbles, tho' in leſs quantity than in moſt others, and often without them. The Nucleus is immediately ſurrounded by a moderately broad cruſt or zone, of a fine milky white, with ſomewhat of the pearly blue in it, and that by a ſecond of the ſame ſtructure and colour with the Nucleus, except that it is more bright and pellucid; over theſe is the cruſt of the whole. The whole of this ſtone is very fine, bright, and tranſparent, but particularly the white circle, which is not at all inferior to many of the genuine Agates: This is the general appearance of this ſpecies, but it is ſubject to the ſame varieties with the reſt, of having its veins leſs regularly diſpos'd, or blending one with another, or both with the matter of the Nucleus, and making together but one plain and fine brown maſs.

It breaks with a very beautifully even, bright, and gloſſy ſurface.

It is conſiderably tranſparent in thin pieces.

It is extreamly hard, and capable of a fine poliſh.

It very freely and readily gives fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis.

It burns to a reddiſh white.

Examin'd by the Microſcope, it appears of a very beautiful, even and cloſe texture, and more bright and tranſparent than moſt of the other Pebbles; its white veins are the moſt ſo, and are indeed very elegant and fine.

It is found in many of our gravel pits, tho' not ſo common as ſome of the former; I have obſerv'd it plentifully about Iſlington, and ſometimes in the pits on Hampſtead heath, but there more rarely.

6. *Calculus nucleo, minori, e fuſco, flavo, cruſtis albidis, fuſcis, carneis & flavis.*

Small, browniſh, yellow center'd Pebble, with white, brown, red, and yellow cruſts.

This is an extreamly elegant ſtone, and often ſuperior to many of the foreign Pebbles in beauty; it is of a very fine, cloſe, and firm texture, of the ordinary wrinkled ſurface of pebbles, generally of a roundiſh or oval ſhape, ſeldom much flatted, and commonly ſmall; an inch diameter, or a little more, is its uſual ſize, but I have ſeen ſpecimens of it much larger, tho' they are leſs common. It is compos'd of a ſmall orbicular central Nucleus, generally of the bigneſs of a ſmall nutmeg, of a conſiderably fine and bright texture, and of a lively and agreeable yellowiſh brown; this is immediately ſurrounded by a circle of about one tenth of an inch broad, of a dull, opake, and impure white; that by one of equal breadth, of a very pale whitiſh brown; that by a third, of an elegant pale red, or fleſh colour; that by a fourth, generally very narrow, and of a blackiſh brown; and all theſe by one as broad as any of the reſt, of a pale yellow, without which is the common coat of the ſtone. The Nucleus in this ſtone is but moderately bright, and has very little tranſparence; the white circle that ſurrounds it is more coarſe, more dull, and more opake than it, but all the reſt are very bright, and beautifully tranſparent; the pale and deep brown are both of them very elegant colours, and of very nearly a pure flinty texture, and the red is extreamly beautiful and bright; the outer circle of yellow is pale, but very pure, clear, and tranſparent: This is the uſual appearance of the ſtone, and when of about an inch in diameter, which is its moſt uſual ſize, it is an extreamly beautiful maſs; the varieties it is ſubject to, are owing to the ſame cauſes, and of the ſame nature with thoſe of the reſt of the Pebbles, and may be known and refer'd to their proper ſpecies, by conſidering what an admixture of theſe colours would produce, if thrown together, either in ſo ſoft a ſtate as abſolutely to blend together, and make one maſs, or driven irregularly into confus'd or mix'd veins.

It is leſs tranſparent than the former ſpecies, tho' more ſo than moſt of the Pebbles.

It is very hard, and capable of an elegant poliſh.

It breaks with a fine, even, flinty ſurface.

It very freely and readily gives fire with ſteel.

It makes not the leaſt efferveſcence with Aqua Fortis.

It burns to a mottled maſs of grey and reddiſh.

Examin'd by the Microſcope, its different parts all appear of different degrees of fineneſs, but have all of them their beauty, the red in particular is very elegant; it often happens in this ſpecies alſo, that the Microſcope diſcovers a multitude of ſmall whitiſh ſpecks, like thoſe that ſo frequently blemiſh the Pebbles, eſpecially in their Nuclei, tho' none ſuch are, for the moſt part, diſtinguiſhable in this by the naked eye.

It is no uncommon ſpecies in the gravel pits about London; and if our lapidaries would take the trouble of cutting it, would make a very beautiful figure in the tops of ſnuff boxes.

7. *Calculus nucleo, minori fuſco, cruſtis albido-griſeis, pallide-fuſcis, & e fuſco carneis.*

Small, brown center'd Pebble, with greyiſh white, pale brown, brown and reddiſh cruſts.

This is another very elegant and beautiful Pebble, and well worthy the notice of our lapidaries; it is of an extreamly cloſe, fine, and compact texture, of the common wrinkled ſurface of Pebbles, of a roundiſh, or oval, and generally ſomewhat compreſs'd or flatted form, and frequently of four or five inches in diameter; it is compos'd of a central Nucleus, uſually of the ſize of a nutmeg, and of a ſtrong deep brown; this is ſurrounded by a moderately broad circle, of a pale whitiſh grey, that by a narrower, of the ſame ſubſtance and colour with the Nucleus; over theſe there are generally four or five, ſome of the ſame matter with the Nucleus, and others of a very pale, whitiſh brown, alternately diſpos'd; and over theſe four, five, or ſix others alternately, of the ſame brown of the Nucleus, and of an extreamly pale brown, with a ſlight admixture of a faint red; over all theſe lies the cruſt, which is generally whitiſh, and leſs wrinkled than that of moſt other Pebbles; the different zones or circular cruſts of this ſtone ſeem all much of the ſame texture and fineneſs, but the greyiſh and pale brown have moſt tranſparence; the Nucleus is frequently ſpotted with ſmall black points: This, like the other Pebbles, is ſubject to many varieties, but from the knowledge of its proper colours may always be known, and in its moſt irregular ſtate reduc'd to its ſpecies.

It is more tranſparent than moſt of the other Pebbles, and breaks with a fine, even, flinty ſurface.

It is very hard, and capable of an elegant poliſh.

It very freely gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It burns to a reddiſh and greyiſh white.

Examin'd by the Microſcope, it appears of a very equal texture in moſt parts, but in the whiter has moſt purity and tranſparence; in the moſt colour'd veins, the adulterating earth may be plainly diſcover'd, but is mix'd unequally with the maſs, leaving a pure flinty matter in ſome places, and appearing in thick clouds compos'd of diſunited Moleculæ in the reſt.

It is very common in the gravel-pits on Hampſtead Heath, and is worth the cutting and working into toys.

8. *Calculus nucleo, e carneo-fuſco, cruſtis flavis, rubeſcentibus, & albido-cæruleis.*

Reddiſh, brown center'd Pebble, with yellow, red, and blueiſh white cruſts.

This is one of the fineſt of our Engliſh Pebbles, and is not at all inferior to the greater part of the German Agates; it is of an extreamly fine, compact and firm texture, generally of a ſmooth and leſs wrinkled ſurface than moſt of the other kinds, of a roundiſh but compreſs'd ſhape, and moſt frequently of about three inches in diameter; it is uſually compos'd of a moderately large and irregularly oval central Nucleus, which is of a very fine texture, and conſiderable brightneſs and tranſparence, and of an agreeable pale brown, with an evident admixture of a pale red or fleſh colour in it; this is ſurrounded by a broad circle of a very beautiful pearl colour, or blueiſh white, extreamly beautiful, pure, bright and tranſparent, and much reſembling the matter of many of the finer Agates; round this is laid a narrower circle of a very elegant red, and without this, a number of other pearl colour'd and red cruſts or circles, placed in a regular and beautiful alternate order; beyond theſe are placed three or four circles of a pale yellow, and theſe are cover'd with the common Pebble coat which is of a whitiſh or blueiſh colour; the red veins in this ſtone are very bright and tranſparent, tho' ſomething leſs ſo than the pearl colour, and the yellow which are leaſt ſo of all the others, are bright and clear enough to have made an elegant figure in a leſs pure ſtone; this ſpecies is ſubject to many variations, from the original diſtribution, and different manner of blending its ſeveral conſtituent parts, but this is its moſt uſual appearance.

It is more tranſparent than moſt of the Pebbles, and breaks with a very beautifully even and regular ſurface.

It is very hard, and capable of the higheſt poliſh.

It very readily gives fire with ſteel.

It will not in the leaſt ferment with Aqua Fortis.

It burns to a mottled reddiſh and grey maſs.

Examin'd by the Microſcope, its ſeveral parts all appear very beautifully tranſparent; its Nucleus is the leaſt ſo of any, but that is very bright and of an agreeable colour; the whitiſh veins have very much of the miſty look of the Chalcedony, only with leſs purity and brightneſs; the yellow are plainly ſtain'd by a yellow earth, which in many places is diſcover'd in ſmall Moleculæ imperfectly mix'd with the flinty matter; and the red, which makes a very elegant appearance, has much of the diluted purpliſh hue of the Amethyſt, tho' cloudy in a greater degree than the white.

It is common about Kenſington and in many other of our gravel pits; the white and red veins are generally placed alternately and evenly together, and tho' our lapidaries have not got into a way of uſing the whole maſs of the ſtone together, a gentleman of my acquaintance has a pair of ſleeve buttons cut out of this part of it, which ſomebody was honeſt enough to ſell him for Sardonyxes; 'tis certain they have much of the Sardonyx look, and take a fine poliſh, but the difference in the texture, and purity of the two ſtones, is what a jeweller I hope could not be deceiv'd in.

9. *Calculus nucleo fuſco, cruſtis albis, aurantiis, fuſcis, & ſordide flavis.*

Brown center'd Pebble, with white, orange colour'd, brown, and duſky yellow cruſts.

This is another of the elegant Pebbles our gravel pits abound with; it is of a very fine, cloſe, compact and firm texture, of a wrinkled ſurface like the reſt of the Pebbles, generally of a pretty regularly orbicular or oval form, ſeldom much flatted, and of from one to three inches in diameter; it is compos'd of a very ſmall central Nucleus, ſurrounded by a very great number of variouſly colour'd circular cruſts diſpos'd in an elegant order; that which immediately ſurrounds the Nucleus is generally one of a very pure and clear white; immediately over this lies one of a deep orange colour, and over theſe eight, ten, or more of the different colours that can be form'd by various admixtures, of brown and yellow, with ſeveral others of a duſkier white, and fine orange colour between them; the whole ſubſtance of this Pebble is very pure, bright and tranſparent; and the ſeveral cruſts, which is rarely the caſe in theſe ſtones, are pretty nearly equally ſo; it is ſubject to many variations from the blending the different colours of the ſubſtances it is compos'd of, and often ſeems to want one or more of them; it ſeldom, however, really does ſo, but thoſe which do not appear, will be found on a ſtrict examination embodied in the reſt; what I have given as the natural order and diſtribution of its Nucleus and veins, is in this as in all the reſt, far from being an univerſal deſcription; the uncertainty of the ſtate of hardneſs in which the ſeveral added quantities of matter in theſe bodies found one another, and their degree of concretion makes ſuch differences in the ſame ſtone, that no certain or univerſal deſcription of the order of the cruſts can be eſtabliſh'd; often the Nucleus becomes blended with its two or three neareſt cruſts, and in that caſe becomes as big as a walnut, inſtead of being of the ſize of a horſebean; and two or three of the cruſts in like manner confuſedly blending together in other inſtances, make very broad and irregularly colour'd veins in it; all that is meant by theſe deſcriptions of the order of the cruſts, is to give an idea of what ſeems their moſt natural diſpoſition, as they are all taken from obſervation, of what ſtate they are moſt frequently found in, in a number of ſpecimens of the ſame ſtone.

It breaks with a fine, even and gloſſy ſurface, and is extreamly hard, and capable of a very beautiful poliſh.

It very freely and readily gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a mottled brown and grey, with ſome blotches of a reddiſh hue.

Examin'd by the Microſcope, its ſeveral parts appear all nearly of equal brightneſs and tranſparence, and all leſs loaded with earth than is uſual in theſe ſtones, tho' the earth they contain is no where perfectly or equally mix'd with them.

It is very common in the gravel pits on Hampſtead-Heath, and in many other place about London; but the moſt ſurprizing quantity that I have ever ſeen of it, or indeed o any one ſpecies together, is about Windſor, where in two or three gravel pits the ſtratum ſeem'd made up of hardly any other ſpecies.

10. *Calculus hebes, nucleo pallide fuſco, cruſtis albidis, fuſcis, & ſubflavis, craſſioribus.*

Dull, brown center'd Pebble, with thick, whitiſh, browniſh, and yellowiſh cruſts.

This is a very ſingular ſpecies of Pebble, tho' of leſs beauty than many of the other kinds; it is of the coarſeſt texture of all the Pebbles, yet conſiderably firm, compact and hard; of a very ſmooth and equal ſurface, often wholly without thoſe wrinkles ſo frequent in the coats of the Pebbles, and when it has any of them, they generally are few and ſlight; it is ordinarily of an orbicular but ſomewhat compreſs'd figure, and of about two, or from two to three inches in diameter; it is uſually compos'd of a ſmall central Nucleus, not exceeding the ſize of a horſebean, ſurrounded firſt by an irregular and undulated cruſt, compos'd of various very narrow ones, and after that, by three or four others, all ſimple and plain, and each very broad and thick; the Nucleus itſelf is of a pale whitiſh brown, and the cruſts are ſome of a very deep brown, ſome of a yellowiſh hue, and others of a duſky pale blue, or blueiſh white; one of the yellowiſh ones generally immediately ſurrounds the Nucleus, a very broad pale brown one ſucceeds this, a deep brown one lies over this, and round that another yellow one; and laſtly, over that a broad one of the duſky pearl colour, cover'd by the common coat of the ſtone; theſe are all of one and the ſame texture, tho' of theſe different colours, and are ſo highly ſated with their ſeveral earths, as much more to emulate the appearance of Quarry-ſtone than of a Pebble; they are of a rude dull appearance, and perfectly opake. What is here deliver'd of the order of their diſpoſition round the Nucleus, is the moſt uſual method they lie in, tho' there are in the different ſpecimens the ſame varieties as in the other Pebbles; it is the leaſt pellucid of all the ſtones of this Genus.

It breaks with a rough, irregular and dull ſurface, yet is conſiderably hard, and capable of a good poliſh.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a duſky mottled grey.

Examin'd by the Microſcope, it appears of a coarſe texture, but poorly tranſparent in any part but beſt in the yellow cruſts; and, which one would not expect, worſt of all in the whitiſh.

It is a very ſcarce Pebble, I remember to have ſeen it in Northamptonſhire, and Hertfordſhire, and once or twice I think on Hampſtead-Heath, tho' there not regularly mark'd, but with the cruſts very confuſedly blended one with another.

11. *Calculus nucleo majori albido-cæruleo, cruſtis flavofuſcis & cinereis.*

Blueiſh white, large center'd Pebble, with yellowiſh-brown, and aſh-colour'd cruſts.

This is one of the more pure and elegant ſpecies of Pebbles; it is of an extreamly fine, compact and firm ſtructure, of an equal but wrinkled ſurface, generally of a roundiſh compreſs'd form, and from one to four inches in diameter; it is compos'd of a large and very beautiful central Nucleus, taking up the far greater part of the ſtone, and ſometimes almoſt the whole of it; this is of an extreamly fine texture, very bright and pellucid, and much approaches to the white Cornelian; it is of a very agreeable pearl colour or blueiſh white, and tho' thus bright and lucid in moſt parts, has often clouds, ſpots and veins, or ſtreaks of a more opake and duſky white in it; this is environ'd by a very elegant yellowiſh brown cruſt, very bright, clear and tranſparent, and that by one of a pale aſh-colour'd grey, not leſs pure; theſe are cover'd by the common coat of the ſtone which is of a blueiſh or aſh-colour, and often make up the whole ſtone, tho' the central Nucleus is often ſo large as only to leave in a ſtone of three inches diameter, one ſixth of an inch for the cruſts; this, however, tho' the general, is not the univerſal deſcription of the ſtone, the cruſts ſometimes take up more room, and are divided into ſome of plain brown, others of a pure yellow, and theſe alternately ſeparated by the grey ones; ſometimes alſo, tho' that more rarely happens, inſtead of the central Nucleus being ſpotted with a coarſe, opake, white matter, it is all over of that ſubſtance.

It is more tranſparent than moſt of the Engliſh Pebbles, and is very hard, and capable of a very perfect and elegant poliſh.

It breaks with a fine, even, flinty ſurface.

It very freely and readily gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a pure white in the Nucleus, and to a reddiſh brown in the cruſts.

Examin'd by the Microſcope, the Nucleus has much the appearance of ſome of the fineſt German Agates in their pureſt parts; the cruſts are very pure, bright and pellucid, but ſeem a little more loaded with earth than the Nucleus, and to have it more imperfectly mix'd in them.

It is common in the gravel pits on Hampſtead-Heath, but much more ſo about Windſor, and in ſome parts of Northamptonſhire.

12. *Calculus elegans, nucleo majori, albido, cruſtis carneis, fuſcis & albido-cæruleis.*

Elegant, large, white center'd Pebble, with fleſh colour'd, brown, and blueiſh white cruſts.

This is another of the finer and more beautiful ſpecies of Engliſh Pebbles; it is of an extreamly fine, cloſe, compact and firm texture, of a ſmooth and equal, and generally but very ſlightly wrinkled ſurface; of an orbicular or oval ſhape, rarely much flatted, and uſually of about two or three inches in diameter; it is compos'd uſually of a large white central Nucleus of an oblong form, and with leſs blueiſhneſs in it than the former, but of an equally fine, bright and pellucid ſubſtance; this is ſurrounded by a great number of very narrow cruſts of a pale brown, a blueiſh white, and a very agreeable bright light red, plac'd alternately and cover'd by the common coat, which is generally whitiſh; theſe veins ſeem all very nearly of the ſame purity and fine texture, and have about an equal degree of brightneſs and tranſparence; the ſtone, however, often deviates from this which is its uſual order and diſtribution in its different matter; and, like the reſt, from the different admixtures, diſpoſition, and blending of its veins, aſſumes many different appearances; the moſt uſual variety in it is to find the Nucleus, inſtead of its natural pure white, ſtained with a pale fleſh-colour, and that generally in the greateſt degree at the edges, and often not at all in the very centre, toward which the tinge every way grows paler; in the uſual order of the cruſts in the ſtone, a fleſh-colour'd one immediately ſurrounds the Nucleus, and nothing is more eaſy to conceive, than that one of theſe Zones falling on the Nucleus while ſoft enough to admit it, blended in a great part with the matter of the Nucleus, muſt make this very fleſh-colour in its extream edge, which would naturally alſo die away as it approach'd the centre, and leave that perfectly free and conſequently white, and of its own colour.

The whole ſtone is very bright and tranſparent, and of a hardneſs capable of the fineſt poliſh, and breaks with a very ſmooth, even and gloſſy ſurface.

It very freely and readily gives fire with ſteel.

It will not ferment with Aqua Fortis.

It burns to a pure white throughout.

Examin'd by the Microſcope, it is a very beautiful object; its ſtructure is as ſmooth and equal as that of the Agates, and its tranſparence not much inferior to them, eſpecially in its white parts.

It is common in the gravel pits of Hertfordſhire, and ſometimes gets up to London among the lapidaries, and is wrought into tops of ſnuff-boxes; I have ſeen ſmall vaſes of it, alſo call'd by the jewellers who had them to ſell, by the fine name of Agate Onyxes, and pretended to be of Oriental-ſtones, and valued at a great price; it takes a poliſh equal to many of the Oriental Agates, but wants their tranſparency and purity.

13. *Calculus elegans, nucleo albo, cruſtis rubris, carneis, & flaveſcentibus.*

Elegant Pebble, with a white Nucleus, and red, fleſh-colour'd, and yellow cruſts.

This is alſo another of the more fine and beautiful of the Engliſh Pebbles; it is of a very fine, cloſe, compact texture, of a wrinkled ſurface like that of the other Pebbles; generally of an orbicular, ſo ſometimes of a long form, ſeldom much flatted, and uſually of about three inches in diameter, tho' ſometimes larger, and very frequently much ſmaller down to an inch or leſs: it is compos'd of a white central Nucleus, uncertain in ſize, but uſually large, of a very fine texture, yet remarkably opake, and frequently full of ſmall, roundiſh and coarſe ſpots; this is uſually ſurrounded immediately by a narrow or thin cruſt, of a very fair red, that is generally ſucceeded by one of a bright and beautiful yellow; over that lies another of fleſh-colour, uſually a broad one, and over theſe four, five, or ſix, ſometimes more, but much oftner fewer of the ſame colour, beautifully rang'd, tho' not always in a regular alternate order; theſe cruſts are ever very bright, and much more tranſparent than the Nucleus, and of theſe the fleſh-colour'd are always the moſt ſo, and next to theſe the yellow; the ſtone is uſually found with the cruſts thus regularly diſpos'd, but often varies from its natural ſtructure; the veins often blend with one another, and make one obſcure and mixt colour; ſometimes they and the Nucleus all blend into one maſs, but more frequently they are either found not form'd into cruſts at all, but thrown into irregular lines and veins like the variegations of the Agates; or what is more remarkable, each concreted into a ſeparate lump of itſelf, and all joined into one maſs made up of three or four large blotches of white, yellow, and two reds irregularly thrown together, but adhering faſt to one another; the firſt of theſe accidents has happened by the matter of the ſtone not being added at ſeveral times in form of cruſts, but all thrown together while ſoft into one maſs; and this being too far concreted to blend perfectly into one ſimple lump, the motion of the water has driven the colour'd ſubſtances into irregular but generally concentric lines as in the Agates; the other by the matters which ſhould have form'd the ſeparate cruſts by being apply'd round the Nucleus of the ſtone, having inſtead of that concreted each alone into a ſeparate little Pebble of its own colour, and theſe before too far harden'd, having fallen together and cemented into an irregular maſs; the Nucleus of this is very opake, but the veins all conſiderably tranſparent.

It breaks with a fine, ſmooth and even ſurface, is very hard, and takes an elegant poliſh.

It very freely gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It burns to a mixt brown, reddiſh and grey.

Examin'd by the Microſcope, the Nucleus appears extreamly loaded with earth, but that a very ſubtile one, and very equally mixed; the white ſpots are extreamly obſcure and opake, and approach more to the appearance of a Quarry-ſtone than of a Pebble, the cruſts are very tranſparent and of a fine texture.

It is frequent in the gravel pits on Hampſtead-Heath, and has been formerly us'd by the lapidaries; the preſent race of them know it not, but it is frequently found work'd into ſmall vaſes, &c.

14. *Calculus nucleo albido griſeo, cruſtis fuſcis & flavis, tenuiſſimis, numeroſis.*

Greyiſh white center'd Pebble, with very thin, and numerous brown and yellow cruſts.

This is another of our very beautiful Pebbles; it is of an extreamly fine, compact, and cloſe texture, of an equal and leſs wrinkled ſurface than many of the other Pebbles, and generally of an orbicular form, a little flatted, and from one to four or five inches in diameter; it is compos'd of a large central Nucleus, of a very fine texture, but, like the former, ſomewhat more opake than the reſt of the ſtone, and of a mixt greyiſh and white colour; ſometimes theſe colours are perfectly blended in it, and make it one ſimple colour between them, but very frequently they are disjoin'd, and ſome parts of the Nucleus are very white, and others of a deep blueiſh grey; it is ſubject, like the former, and many other of the ſpecies, to a number of ſmall opake grey ſpots, which are of a coarſer texture, and much take off from its beauty: This Nucleus is encloſ'd in a vaſt number of extreamly fine and thin cruſts, which are of two colours only, a pale browniſh yellow, and a duſky brown; they are laid evenly and regularly in an alternate order over one another, and repreſent, in all things but colour, the zones of the Onyxes. I have one of the Pebbles by me, in which twenty five of theſe cruſts may be diſtinctly counted in the ſpace of a quarter of an inch broad; theſe are very bright and beautiful, and moderately tranſparent, and are ſurrounded with the thickeſt outer coat of all the Pebbles; it is white, opake, and dull, but has often a plain ſmooth edge within its wrinkled ſurface, reaching to the cruſts of the ſtone; this, however, like many other things in this and the other Pebbles, is not ſo fix'd and certain as not to be ſometimes wanting, or ſcarce diſtinguiſhable. The cruſts of this ſpecies always preſerve nearly the ſame degree of brightneſs, but the Nucleus varies very much, and in ſome is extreamly coarſe, rough, and opake: it is often alſo either yellowiſh at the edge, or ſpotted with yellow ſpecks, or ſhort lines there, from its having taken into it one or more of the neareſt zones.

The ſtone breaks with an even and gloſſy ſurface, and is very hard, and capable of a fine poliſh.

It very freely gives fire with ſteel.

It will not ferment with acids.

It burns to a pure white in the Nucleus, and to a reddiſh brown in the cruſts.

Examin'd by the Microſcope, its Nucleus appears oddly variegated; it is very ſeldom, in ſhort, that the grey and white ſubſtances it is compos'd of, are well mix'd, and it generally is ſeen, by this means, ſtreak'd and vein'd with the grey; the cruſts are very pure, and the external coat perfectly like that of the flints, only more compact and hard, as containing more cryſtal in proportion to its earth.

It is very common among gravel throughout Hertfordſhire, and is ſometimes found on Hampſtead Heath.

In the gravel pits on Hampſtead Heath, it is not unfrequent to find ſmall ſhells immers'd in the Nucleus of this ſtone: the ſpecimen which I preſerve of it has two ſmall Pectunculi finely ſtriated, and very elegant; but there is alſo another beautiful accident, to which the ſmaller ſpecimens of it are ſometimes liable, that is, to have the Nucleus ſhrunk from its proper dimenſions, detach'd and looſe from its immediately inveſtient cruſt, and rattling in it when ſhaken; the ſtone in this ſtate is an elegant Ætites: beſide this, it has alſo ſometimes another yet more elegant variation, and that in the larger ſpecimens only; where the Nucleus has been very large, and the firſt cruſts having been laid upon it, while yet very ſoft and moiſt, it has ſunk conſiderably away from them, and the ſubſtance of the inner cruſt, to fill the cavity, has thrown out a multitude of extreamly beautiful bubbles; theſe are of a yet purer ſubſtance than the cruſts themſelves, very bright and pellucid, and reſemble very elegantly the Botryoide tubercles of the Hæmatites, or Bloodſtone, hereafter to be deſcrib'd; they are generally lodg'd in cluſters, of eight, ten, or more together, like ſo many grapes hanging cloſe upon a bunch, and are ſometimes irregularly terminated on their ſurfaces, but more uſually are of a very elegantly pointed form, and cover'd all over with very minute, but regular hexangular cryſtals; the inner ſubſtance of them all is ſtriated like that of the Hæmatite; but the Striæ are extreamly minute and ſlender, and often not diſtinguiſhable without the aſſiſtance of glaſſes; this ſtriated texture, in many Foſſils, has been an occaſion of great difficulties and errors about theſe things: Dr. Woodward has ſeem'd, in moſt places where he treats of Foſſils in this figure, to attribute it to an admixture of a ſtriated Talc with the cryſtalline matter, which he ſuppoſes has determin'd it to this form; but ſurely it is not neceſſary to have recourſe to ſo uncertain a ſolution. When we conſider, that theſe things are all mere efflóreſcences, as we may call them, or ſeparations of matter from the ſubſtance of the ſtone itſelf, we can have no reaſon for imagining that the common Pebbles contain any ſtriated Talc in them; and if we will but go back to the formation of theſe bubbles, ſhall find that their ſtructure could not naturally have been any other than ſtriated, ſince the ouzing of any matter from out a compact maſs, and thro' the extreamly minute pores of a compact and fine ſtone, could not be otherwiſe than in long ſtrait lines; the matter of a multitude of which hardening together, could form no other than a Congeries of extreamly fine threads, rang'd as cloſe as the pores of the ſtone they exſudated thro'; and theſe muſt neceſſarily form a maſs of what we call a ſtriated texture; the ſame matter, mix'd together at the extremities of theſe, if ſoft enough, would naturally concrete into its own form, as we ſee in thoſe bubbles which are cover'd with regularly form'd cryſtals; but if too ſtiff, would blend itſelf into the irregular ſurface we find in the greater part of them.

The ſpecimens of the ſtone, in this ſtate, are found in very various circumſtances, ſome are plain Ætitæ, with a compact Callimus, or detach'd Nucleus rattling in them, others have the ſame Nucleus reduc'd to ſmall lumps, or ſometimes to a whitiſh powder, from its rolling violently about ſince detach'd from its cruſt; but the moſt frequent inſtance we have, are in broken ſpecimens, in which the bubbles are very clean, as if waſh'd, whereas in thoſe found whole, we find them, on breaking, extreamly foul'd by the powder of the Nucleus; they are, however, when clean, ever beautifully pellucid, and on all trials, both they and the matter of the Nucleus, whether whole or reduc'd to powder, anſwer to all the characters of cryſtal and earth alone. I mention this, becauſe an erroneous opinion has prevail'd, of their being of the ſame ſubſtance with the bubbles, ſometimes found on the ſurfaces of the partitions of the Septaria, which are abſolutely different, and of the ſame Spar with thoſe partitions.

15. *Calculus nucleo, albido-griſeo, cruſtis flavis, fuſcis & albis.*
Greyiſh-white center'd Pebble, with brown, yellow, and white cruſts.

This is alſo another of our beautiful Pebbles; it is of a fine, cloſe, and compact texture, of a very rough and wrinkled ſurface, generally of an oblong, but ſomewhat compreſſed form, and very various in ſize; many ſpecimens of it being found, of one inch, and many of four or five inches diameter; it is compos'd of a whitiſh grey central Nucleus, of very various ſizes, often not bigger than an horſe bean, in a Pebble of many inches diameter, and often of an inch broad in a ſmaller; it is pretty highly ſated with earth, and tho' of a very ſmooth and gloſſy ſurface, is very opake; this is ſurrounded by a multitude of fine and regular cruſts, diſpos'd beautifully on one another, and of three colours, ſome are of a fine deep brown, others of a very pale yellow, with ſome admixture of brown in it, and others of a very good white; the brown is what generally immediately ſurrounds the Nucleus, and the reſt are diſpos'd alternately round more cruſts, of that and one another; the white in this ſpecies, when pure, has a very beautiful effect, but it ſeldom is ſo, generally having receiv'd a tinge from the cruſt it lies on, or from that which lies on it, and appearing either ſomewhat browniſh or yellowiſh; without all theſe there frequently occurs in this ſpecies a thick coat of a flinty grey, but this not always; often a broad brown zone is the entrance, and is immediately cover'd by the common coat of the Pebble, which is generally of a blueiſh grey; the ſeveral cruſts of this Pebble are all much of the ſame purity and ſtructure, and tho' more ſated with earth than thoſe of many other of the ſpecies, yet are very bright and beautiful: This ſpecies varies, like the reſt, in the order and mixture of its ſeveral colour'd parts.

It breaks with an even and gloſſy ſurface, and is very hard, and capable of an elegant poliſh.

It freely gives fire with ſteel.

It does not in the leaſt ferment with Aqua Fortis.

It burns to a brown and grey.

Examin'd by the Microſcope, it appears in all parts pretty highly ſated with earth, and very equally ſo in the different cruſts, and in the Nucleus; the adulterating earth, however, ſeems very ſubtile, and very uniformly and equally diffus'd; the brown veins are, if any, the moſt clear and pellucid, but all are very gloſſy.

It is common on Hampſtead Heath, and in the gravel pits about Iſlington.

16. *Calculus nucleo, albiſſimo, cruſtis albidis, cinereis, flavis, & carneis.* *Very white center'd Pebble, with white, grey, yellow, and fleſh colour'd cruſts.*

This is a ſpecies, which tho' of the moſt variety of colouring of almoſt any Engliſh Pebble I know of, is yet very far from being one of the moſt beautiful; its colours are always dead, and are often, one or more of them, wanting in the particular ſpecimens; it is of an even, compact, and cloſe texture, of a very rugged, or much wrinkled ſurface, generally of a flat, but roundiſh ſhape, and from one to two, or ſometimes three inches diameter; it is compos'd of a central Nucleus, of various ſize in the different ſpecimens, from the bigneſs of a pea to that of a walnut, of a fine even texture, but perfectly opake and dull, and of a white, generally very pure and perfect, but ſeldom what can be call'd a bright or pleaſing one: This is very variouſly and irregularly ſurrounded by a conſiderable number of cruſts, of different thickneſſes, and of different colours; ſometimes all that belong to the ſpecies, the grey, the white, the yellow, and the fleſh colour'd, appear diſtinct and perfect in one ſtone; but this is rare, for, partly from their having been thrown upon one another before harden'd, and partly by other accidents, they are very frequently blended in ſuch a manner with one another, as to appear not at all diſtinguiſhable; the yellow and the fleſh colour often blending into a ſtrange ſort of a pale orange colour, and the white and the ſame yellow more frequently into a very dead and diſagreeable colour; the cruſts are of very uncertain breadth, and very irregularly diſpos'd in the various ſpecimens; what I can learn from the moſt perfect of them, is, that the Nucleus ſeems naturally, and moſt frequently ſurrounded, firſt by a circle of yellow, that by one of white, that by a third of fleſh colour, and that theſe are added alternately for ſome more ſpace before the grey or flinty looking ones appear, which are the moſt pure and perfect of any, and moſt approach to a flinty texture; it is not unfrequent in this, and ſome other of the ſpecies, but more than any other in this, to find the central Nucleus plac'd a good way from the middle of the ſtone; but the occaſion of this appearance will appear plainly, to a curious obſerver, to be the addition of a large quantity of freſh matter to the maſs, only in one part, perhaps when the ſtone was now ſunk, and at reſt, and lay upon the bottom, ſo that the freſh added matter could not ſurround it; the part where the Nucleus is plac'd, will in this caſe always be ſeen to have once been the true center of the ſtone; but in many other inſtances the matter of the whole maſs has concreted at once, and been driven into various directions by the motion of the water, and there has properly been no central Nucleus, nor any cruſts at all; in this caſe the lines are ever concentric, and diſpos'd round one or two irregularly ſhap'd, and irregularly plac'd points, as in the Agates.

This breaks with a ſmooth and even, but not gloſſy ſurface, and is conſiderably hard, and capable of a good poliſh.

It freely gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It burns to a mix'd and mottled grey.

Examin'd by the Microſcope, it appears, tho' of a very even ſtructure, yet in moſt parts more opake than moſt other of the Pebbles; its grey veins are moſt tranſparent, and its yellow the next to them.

It is very common in the gravel pits about London; it is found in various ſtates, but is not often met with perfect.

17. *Calculus nucleo albido fuſco, cruſtis ferrugineis, & ſubflavis.* *Browniſh-white center'd Pebble, with brown, ferrugineous, and yellowiſh cruſts.*

This is a Pebble generally of a very regular ſtructure, and of a pleaſing variety of colours, but is one of the coarſeſt of the ſtones of this Genus, and therefore wants the brightneſs, beauty and gloſſy ſurface of the reſt; it is of a coarſe and rough, but very hard, and compact texture, of an unequal ſurface, generally leſs wrinkled indeed than that of moſt others, but full of frequent irregular prominencies and cavities; it is of an irregular ſhape, but generally ſomewhat tending to oblong, and from one to three, or ſometimes four inches in diameter; it is compos'd of a ſmall central Nucleus of a pale whitiſh brown, ſometimes almoſt quite white, ſurrounded by four or five cruſts irregular in breadth, but very evenly laid over one another, and of very good colours; that immediately encloſing the Nucleus is generally very broad and thick, and of a ferrugineous, or ruſt colour'd brown; upon that is placed one of a very agreeable pale brown, ſometimes the very ſame with the matter of the Nucleus, but more often of a ſomewhat darker colour: beyond this lies another narrower of the ferrugineous brown, and beyond that one of a duſky tho' not very deep or ſtrong yellow; beyond this is another of the brown, and this is cover'd with the common coat, which is of a pale whitiſh grey; multitudes of ſpecimens that I have examin'd, have had this exact diſtribution of the cruſts; but in others, as in all the other ſpecies, there will appear great variety from the cauſes beforemention'd; the whole ſtructure of this ſpecies is very coarſe, and it has nothing of the brightneſs ſo common in the Pebbles.

It breaks with a rough, irregular and dull ſurface; it is, however, conſiderably hard, and capable of a good poliſh.

It readily gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a mixt reddiſh brown.

Examin'd by the Microſcope, it appears of a very different ſtructure from the generality of the Pebbles; it has little brightneſs, and yet leſs tranſparence; it ſeems greatly loaded with its ſeveral earths, and has in many parts ſpecks very bright and ſhining of pure unmix'd Cryſtal.

It is a very rare ſpecies: I remember to have ſeen it in Northamptonſhire, and once pick'd up ſome ſpecimens of it on Hampſtead-Heath, but never ſaw in plenty except once, in a gravel pit by the road ſide from Hedgerly to Windſor, within a mile of the laſt place.

Beſide the gravel pits of Northamptonſhire, there is, however, one place in which I ought not to omit the having found it, in company with a conſiderable number of ſmall ſpecimens of other ſpecies, this was in the great ſtone Quarry near Weldon in that county. In the ſolid ſtacks of the ſtone in this Quarry, it is very common to find theſe Pebbles immers'd in all directions, ſome horizontally, others perpendicularly, and others aſlant in various angles; this was eaſily diſtinguiſhable where the Pebbles were oblong or much compreſs'd, and is a proof that they were receiv'd into that ſtratum when the matter of it was conſiderably harden'd.

The people of the neighbourhood who took much notice of the thing, ſeem'd greatly ſurpriz'd at it; but to the judicious naturaliſt the wonder will appear greater, that inſtances of this are not more frequent, than that they are ſometimes ſeen; ſince nothing can be ſo eaſy to conceive, as that Pebbles roll'd over ſtrata of ſtone not yet quite harden'd, would naturally ſink into, and become embodied in them; and the only probable reaſon why we don't more frequently meet with inſtances of this, is that, that the ſtrata of ſtone were firſt conſolidated before the matter of the Pebbles concreted into that form.

This obſervation of ſmall ſtones embedded in the ſtrata of others, tho' ſingular from its being very ſeldom obſerv'd, is, however, of very antient date, the oldeſt authors of Foſſils, mention it as a thing known in their time: Theophraſtus, an author, who appears in all his works to have written more from a real knowledge of nature than moſt who follow'd him, tells us, that ſome of the ſmaller and valuable ſtones, among which he mentions the Carnelian, a ſtone nearly ally'd to the Pebbles, were found in the dividing other ſtones, ὁι δὲ ἐν ἑτέροις εὑρίσκονται διακοπτομένοις, are the expreſs words of that author; and Pliny ſtrongly confirms the ſame thing in regard to the Carnelian, the very fineſt of which ſtones, he ſays, were found about Babylon, in the digging in certain Quarries of ſtone, lodg'd in the ſtone of the Quarry in manner of a heart; this was a trifling notion from its red colour I ſuppoſe, the fact, however, is plain, and his expreſs words, are, *Laudatiſſima circa Babyloniam cum Lapidicinæ quædam aperirentur hærens in Saxo Cordis more*; Theophraſtus alſo, afterwards treating expreſly of the Carnelian, aſcertains his former obſervation to that ſpecies, mentioning it particularly, and by name; Εὑρίσκεται δὲ καὶ τὸ Σάρδιον διακοπτομένων τῶν πετρῶν. People who had not look'd into nature themſelves, have been free enough in blaming this account in Pliny, not knowing that he took it from ſo accurate an obſerver as Theophraſtus; from whom indeed the greater part of his accounts of Foſſils are taken, as will be eaſily ſeen on compariſon; but here we find obſervation doing credit to and juſtifying them both.

18. *Calculus nucleo, majori ſub-cæruleo, cruſtis fuſcis & cinereis.* *Blueiſh center'd Pebble, with brown and grey cruſts.*

This is a very fine, and bright ſpecies, but wants variety of colours to make it beautiful; it is of an extreamly fine, compact and firm texture, of a very ſmooth and equal ſurface, leſs wrinkled than moſt other ſpecies, and ſeldom ſubject to prominences or cavities; it is generally of an oblong form, and ſeldom much flatted, and is from one to three inches in diameter; it is compos'd of a large central Nucleus, of a very fine, clear texture, very pure, of a flinty ſubſtance, and of a deep greyiſh blue, ſometimes it is equally and uniformly of this colour, but more frequently is vein'd and ſpotted, either with a lighter or darker of the ſame kind; and never is ſubject, ſo far as I have yet ſeen, to any of thoſe opake ſpots which are ſuch blemiſhes to the generality of Pebbles; this Nucleus is ſurrounded with one broad cruſt, of a fine deep brown, and very bright, and beautiful, and that by a narrower of an aſh-colour, equally bright and tranſparent with the Nucleus, and over theſe is the common coat; which, as in ſome other ſpecies, is pretty thick, and ſhews a white line within its wrinkled outſide, joining evenly to the edge of the outer cruſt, this is the general appearance of the ſtone; but tho' it is moſt uſual for it to have thus only two cruſts beſide the outer coat, yet it ſometimes has four, five, or ſix; and on the other hand theſe two are ſometimes blended into only one; it never receives any other colour into the maſs, and is throughout of an extreamly bright hue, and more pellucid than moſt other ſpecies.

It breaks with a perfectly ſmooth, even and gloſſy ſurface, and is extreamly hard, and capable of the moſt elegant poliſh.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a pure white in the Nucleus, and in the brown cruſts to a duſky ruſt colour.

Examin'd by the Microſcope, it appears extreamly pure, and of a fine texture; its Nucleus is as pellucid and bright as the pureſt Flint, its grey cruſt even more ſo than that, and its brown at leaſt equal to any of the other Pebbles.

It is no very common ſpecies, in ſome parts of Hertfordſhire it is more frequent than any where elſe that I have obſerv'd, but not very common even there.

The outer coat of this Pebble is often of a pure white, and like the other ſpecies which have ſmooth ſurfaces, is in ſome gravel pits very frequently, and indeed almoſt conſtantly cover'd with very beautiful delineations in black, like the Dendoritæ in the Mocoa-ſtones, and in the Ludus Helmontii, as authors have been us'd to call it; theſe are not at all peculiar to the ſpecies, ſince in the pits where it is found mark'd with them all the other ſmooth coated Pebbles, of whatever ſpecies, are found mark'd with them too, and in other gravel pits this has nothing of them; theſe delineations are perfectly accidental in regard to the ſtone therefore, and are occaſion'd by exhalations from below imprinting the figures of ſtars, moſſes, trees, &c. equally on theſe ſtones, on the Septariæ, on chalk, and whatever other ſubſtances of proper ſurfaces fall in their way; in theſe pits alſo, where the ſurfaces of ſtones are thus naturally adorn'd with delineations, the inner ſubſtance of the ſame, or other ſpecies if crack'd, as they often naturally are, are found alſo adorn'd with them, following the cracks, and running out into ramifications from them; theſe, where they happen to the more ſtrongly colour'd ſpecies, make no great figure, but frequently in the whiter kinds emulate the delineations in the Mocoa-ſtones.

It is not unfrequent to find this, and other of the Pebble kind which are ſubject to natural cracks, parted at them, and fallen into two halves, one of which is often found at ſome diſtance from the other, and often only one is found; when theſe halves have been thus form'd by the ſplitting of the ſtone at the cracks, their ſurfaces are ever ſmooth and polite, as if freſh broken; but it is not uncommon to find many Pebbles, and none more frequent ſo than this, in natural ſemi-circular maſſes, with flat and very rough bottoms, cover'd by no cruſt, with central Nuclei affix'd on the middle of them, and environ'd by ſemi-circular inſtead of compleatly circular cruſts of the various colours proper to the ſpecies; the flat or baſis of theſe ſpecimens is ever of the ſame matter with the central Nucleus, and the origin of them in this form is no other than this, that a quantity of the matter of the Nucleus ſubſiding to the bottom from among the fluid it had before been ſuſpended in, and there ſpreading itſelf into a flat inſtead of keeping an orbicular form, and receiving on it a ſecond lump or ſmall nodule of the ſame matter, too far concreted to ſpread into a flatneſs upon it, That became afterwards cover'd with its proper cruſts; which not being able to get under it, form'd inſtead of circles figures of half that quantity, and theſe became cover'd afterwards with their natural coat; 'tis very rarely that this Nucleus is in the middle of theſe ſpecimens, more frequently it is near one edge; in which caſe, the additional cruſts ſwell over the flat baſis at one end, and leave it naked at the other; in this caſe their bottoms become rough, alſo from the inequalities of the ſurface they are form'd upon; and if we conſider the very eaſy and natural formation of theſe ſemi-circular Pebbles, we ſhall have occaſion, as in many inſtances beſide, not to wonder that we ſometimes meet with ſpecimens in this ſtate or form, but that they do not occur much more frequently.

Dr. Woodward, hitherto the oracle of young ſtudents in theſe things, has been much puzzled to account for the roughneſs of theſe ſurfaces in the ſemi-circular Pebbles, and ſetting out with the falſe principle of their having been form'd round like the others, and acquir'd this figure and roughneſs on one ſurface, which he judges to be a new one; afterwards is forc'd to have recourſe to that great agent, which ſerves him in almoſt all his exigencies, the force of the water departing at the end of the deluge, and gives us that which he every way makes the Smoother and Rounder of other maſſes of ſtone, or, as the occaſion of the roughneſs of this; it would be natural to aſk why this and no other ſurface of the ſtone was rough'd by being ſlided on by the water ſo departing, as he expreſſes it, or why the broken ſurfaces of all Pebbles which have been equally ſubject to its effects, are not found rough'd in the ſame manner? but it is too plain, that making any power the ſole agent in all, and thoſe even contrary operations, muſt take off its credit of being an agent of any power at all in the opinions of too many.

All are able to criticize upon manifeſt errors, few to ſeparate truths from them; and it is for this reaſon, that while there are ſo many miſtakes in the works of that author, blended with an infinite deal of real knowledge, and many unqueſtionable and everlaſting truths; a few of the young ſtudents in Foſſils adore him, while the generality of the world, who have not examin'd into nature with their own eyes as he did moſt induſtriouſly with his, deſpiſe him, and no one appears to ſay ſo far he was right, but no farther.

19. *Calculus nucleo griſeo, cruſtis albicantibus & rubentibus, cortice craſſiſſimo albo.*

The grey center'd thick coated Pebble, with whitiſh and red cruſts.

This, tho' leſs beautiful than many of the preceding ſpecies, is, for the purity of its texture, and the ſmall quantity of earth it contains, equal to any of them; it is of an extreamly fine, compact, and firm ſtructure, of a very rude, irregular, and unequal ſurface, and is deeply wrinkled, and full of prominences and cavities in many parts. It is ever of a figure approaching to round, and ſeldom much flatted, and is very various in ſize, but moſt frequently of about an inch and half in diameter; it is compos'd of a large central Nucleus, of a duſky grey, of a very equal and ſmooth ſurface, very bright and gloſſy, and extreamly pure and pellucid: This is uſually ſurrounded by a broad red cruſt, ſeldom of a very bright or pure red indeed, but uſually with ſome admixture of a ferrugineous brown in it, and leſs pellucid, or bright, than any other part of the ſtone; round this there lies another broad cruſt, of a very agreeable blueiſh white, or pearl colour, and very bright; and without this the common coat, which is very thick and coarſe, and of a bright white, compos'd of a ſmall quantity of cryſtal, embodied in a maſs of white clay, and making a looſe and lax ſtony ſubſtance: This is the more ordinary appearance of the ſtone, but it ſometimes deviates from this, into a ſimple duſky fleſh colour'd maſs; from the common blending of all the ſubſtances, and ſometimes from their more diſtinct diſpoſition, has, inſtead of two, five, or ſix alternate orders of cruſts, looking like the zones of a German Sardonyx.

It breaks with a perfectly ſmooth, even and flinty ſurface, and is very hard, and capable of the higheſt poliſh; this is, however, to be obſerv'd, not only in this, but other ſpecies of the Pebbles, that it is frequent to find ſpecimens of them more debas'd with earth, and much coarſer, than what from the more general and univerſal habit of the ſtone is deliver'd in its deſcription as its ſtandard.

This readily gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It burns to a pure white, with very little of the ruſt colour, naturally to be expected from its veins.

Examin'd by the Microſcope, it appears more to approach to the Agates and Onyxes, than any other ſpecies of Pebble, and in many parts of its white veins appears colourleſs, and very nearly as bright as pure cryſtal.

It is a ſcarce ſpecies; I have obſerv'd it once or twice in the great gravel pit near Paddington, and ſomewhere in Northamptonſhire, tho' I cannot recollect the place.

20. *Calculus elegans, nucleo albido-ſubcæruleo, cruſtis albentibus, carneis & læte rubentibus.*

Elegant, blueiſh white center'd Pebble, with white, fleſh colour'd, and bright red cruſts.

This is one of the purer and finer ſort of our Pebbles, and notwithſtanding that it has leſs variety of colour than many, is inferior to very few in beauty; it is of an extreamly fine, compact, cloſe, and even texture, of a very rough, wrinkled ſurface, with numbers of ſmall cavities in it, of a roundiſh form, and ſeldom much flatted, and not often exceeding two inches in diameter; it is compos'd of a ſmall blueiſh white, or chalcedony colour'd Nucleus, ſurrounded by a great number of white, fleſh colour'd, and red cruſts, diſpos'd very beautifully, tho' not always in a regular alternate order; the Nucleus is generally immediately ſurrounded by a red one, that by a white, and after that the fleſh colour'd, are diſpos'd irregularly among others of theſe, and have together a very beautiful effect: Every part of this ſtone is very bright and tranſparent, the white veins have nothing of the blueiſh colour of the Nucleus in them, but often ſomewhat of a duſky brown; the fleſh colour'd ſeem alſo to have ſome little tinge of this browniſh caſt, but the red are of a fine pure colour, and perfectly free from it; the outermoſt cruſt of all is generally of a pure white, and the coat of the ſtone a duſky grey: This orderly diſpoſition of the different ſubſtances of this ſtone, where it happens, is a great beauty in it; but it is very frequently wanting, too many of the ſpecimens expreſſing only a diſorderly jumble of the colours, and many more, which have them tolerably diſtinct, not ſhewing them in regular cruſts, but in undulated or concentric lines, like the variegations of the Agates.

It breaks with a very beautifully ſmooth and gloſſy ſurface, and is very hard, and capable of the fineſt poliſh.

It very freely gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It burns to a pale fleſh colour'd grey.

Examin'd by the Microſcope, it emulates very much the appearance of the Sardonyxes of Germany, but wants ſomething of their clearneſs; not that I imagine that is ſo much owing to the greater quantity of earth in the Pebble, but to the leſs perfect diffuſion and mixture of it with the cryſtalline.

It is a very common Pebble on Hampſtead Heath, and in very many other places about London.

21. *Calculus elegans, nucleo cinereo-cæruleo, cruſtis fuſcis, flaveſcentibus, & carneis.*

Elegant, greyiſh-blue center'd Pebble, with brown, yellow, and fleſh colour'd cruſts.

This is another of our finer Pebbles; it is of an extreamly ſmooth, even, and compact texture, generally of an equal, and but ſlightly wrinkled ſurface, of an orbicular or oblong ſhape, but little flatted, and ſeldom exceeding three inches in diameter; it is compos'd of a moderately large, and very beautiful blueiſh grey central Nucleus, of a fine even ſtructure, and very bright and pellucid, ſurrounded by a number of cruſts, of a very agreeable pale brown, a fine red, frequently ſoftening into a fleſh colour, and a pale and ſomewhat obſcure yellow; the moſt frequent order in which the cruſts are diſpos'd, is, that a fleſh colour'd one immediately ſurrounds the Nucleus, a pretty broad one of the brown kind lies over that, and after theſe the yellow is irregularly laid between them: Every part of this ſpecies is bright and pellucid, the central Nucleus, if any, is moſt ſo, and the yellow cruſts the leaſt, but the difference between moſt and leaſt, in this ſtone, is very ſlight; it is ſubject, like the reſt, to many varieties, from the different ſtate and manner of the admixture of the colour'd ſubſtances, but is moſt of all defac'd by the ſmall coarſe ſpots ſo frequent in many of the Pebbles, but, I think, ſcarce in any ſo much as in this.

It breaks with a fine, even, and gloſſy ſurface, and is extreamly hard, and capable of a fine poliſh.

It gives fire very readily with ſteel.

It does not at all ferment with Aqua Fortis.

It burns to a mottled grey.

Examin'd by the Microſcope, it appears of equal purity with any of the Pebbles, and in many parts, particularly in the Nucleus, very much approaches to the Agates.

It is not uncommon on Hampſtead Heath, and ſometimes gets into the hands of our lapidaries, who work it into ſnuff-box tops, and other ſuch toys, in which it makes a very pretty appearance.

22. *Calculus elegantiſſimus, nucleo cæruleo-viridi, cruſtis albis, flavis, carneis & rubeſcentibus.*

Elegant, greeniſh-blue center'd Pebble, with white, yellow, fleſh-coloured and red cruſts.

This is without exception the moſt beautiful of all the Engliſh Pebbles, and in its various appearances, according to the different ſtate and manner of the admixture of its variouſly colour'd parts, comes up to the fineſt of the German Agates. It is of an extreamly fine and ſmooth texture, very compact, firm and hard, of a ſmooth and equal ſurface, having uſually fewer wrinkles than almoſt any other ſpecies, of an orbicular or oblong figure, rarely much compreſs'd, and frequently of three or four inches diameter; it is compos'd of a moderately large central Nucleus, ſometimes regularly round, but more frequently oblong or oval, of a delicately fine texture, and gloſſy ſurface, and in thin pieces very tranſparent; generally of a deep blueiſh green, ſometimes ſo very dark as to look blackiſh, and often of a duſky blue, without any greenneſs in it, or of a fine clear green, not inferior to that of the green Jaſpers. This is ſurrounded by a great number of extreamly beautiful cruſts, diſpos'd in ſuch elegant order as to repreſent ſo many Zones of an Onyx; they are all extreamly bright and tranſparent, and are ſome of a fair clear white, others of a fine ſtrong yellow, others of a beautiful pale fleſh colour, and others of a bright ſtrong red; they are diſpos'd in very thin or ſlender cruſts, and generally lie very equally and evenly throughout the whole ſubſtance of the ſtone, the fleſh colour and white are generally moſt frequent near the Nucleus, and the yellow toward the ſurface of the ſtone, where alſo it frequently lies looſe and in irregular and diſorderly blotches. This is the more uſual appearance of the ſtone, but no ſpecies is more apt to vary from its general character, or that ſo beautifully as this; it is a common thing to ſee inſtead of theſe narrow veins, only one broad cruſt of a mixt colour, and ſometimes even the Nucleus is diffus'd among that, and forms a Pebble, of a pale yellowiſh red throughout, only ſomewhat duſky toward the center; but more frequently the ſeveral colour'd matters which ſhou'd make ſo many cruſts, and a Nucleus concrete ſeparately, and when they have been already form'd into ſo many irregularly ſhap'd nodules or looſe maſſes, join before they are perfectly hardened, and coaleſcing firmly together, form a general maſs made up of great blotches of blueiſh, green, yellow, red, white, &c. which all cohere firmly, and become form'd into one ſtone, and cover'd with one common coat like that of the other Pebbles; ſometimes one, ſometimes another of theſe colours are wanting in this congeries; the white is more frequently wanting than any other, and the diverſity in the colour of the Nucleus, which now is not to be at at all diſtinguiſhed as ſuch, but makes one ſpot among the reſt, gives a great variety and beauty to the ſtone; it is more pellucid than any other Pebble, when in its natural diſpoſition of cruſts round a Nucleus; in the other ſtate its ſeveral particles ſeem leſs regularly or orderly diſpos'd, and it is ſomewhat more opake. It breaks with a fine even, flinty ſurface, and is extreamly hard and capable of the moſt perfect poliſh.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a variegated brown and red maſs.

Examin'd by the Microſcope, it appears a very elegant and beautiful texture; very pure, but the quantity of earth it contains is, as in the reſt of our Pebbles, ſo even in this fine one, much leſs perfectly and equally diffus'd than in the German ſtones. It lies in ſmall ſpots or disjointed parcels, and gives the ſtone, when view'd with a proper magnifyer, a curdled look.

It is common in many parts of England, I remember to have often ſeen and admir'd it in Northamptonſhire, Oxfordſhire, Hertfordſhire, &c. It is alſo plentiful about London, in the road to Highgate one frequently meets with it, and the gravel foot path from Pancras to Kentiſh-town, has of late been in a manner pav'd with ſpecimens of it; our lapidaries ſometimes cut it into toys, but conſidering how beautiful it is, and how eaſily procur'd, it is wonderful that they do not uſe it much more.

23. *Calculus nucleo carneo, cruſtis albis, fuſcis & ſub-flavis, cortice craſſiſſimo, albo.*

Fleſh colour center'd Pebble, with whitiſh, brown, and yellowiſh cruſts, and a very thick, white external coat.

This Species does not want its beauty, and is withal one of the moſt ſingular and extraordinary that I have met with; it is of a fine, ſmooth and even texture, and very firm and compact, of a very remarkably rude, rough and unequal ſurface, full of a multitude of irregular prominences and cavities, and not without the wrinkles ſo uſual in the coats of the Pebbles, tho' here the other inequalities don't give room for their being ſo numerous; it is the moſt of an irregular and uncertain ſhape of any ſtone of this Genus, it ſeldom much affects the orbicular form, ſo conſtant in theſe, but is ragged and unequal in its ſeveral parts, and more of the ſhape of the Flints than of the Pebbles: It is very various and irregular in ſize, ſpecimens of it being frequently found from one inch to eight in diameter; it is compos'd of a very beautiful central Nucleus, moderately large, in ſhape generally much reſembling the external figure of the ſtone, tho' not always ſo, and of an elegant fleſh-colour, with a ſlight tinge of blue among it; this is ſurrounded in the largeſt ſtones generally with no more than three or four very broad cruſts, of a fine deep brown, a duſky white, with very often ſomething of the brown in it, and others of a pale and ſomewhat obſcure yellow; the general order of theſe is, that a yellow one lies next the Nucleus, a white one over that, a brown one next to that, and ſometimes there are no more, but in other ſpecies another broad or thick yellow one lies over this, bounded by a very narrow line of deep brown, and over it the coat, which is the moſt extraordinary of that of any Pebble; it is of a pale whitiſh brown, of an extreamly coarſe opake matter, and more reſembling an earth than a ſtone, and often half an inch thick; not unfrequently this is alſo cover'd with another of one eighth of an inch of a pure ſnow white, but a little yellowiſh on the ſurface; it is more frequent however, that theſe two are blended together, and become one; theſe opake, coarſe and rough coats are compos'd of a ſmall quantity of Cryſtal, embodied in a very large one of a white clay, and making together a kind of ſoft ſtone; they look as if no other than a dirty chalk, and the common coats of the Flints and Pebbles of this colour are frequently miſtaken for cretaceous, but throwing a piece of one of them into Aqua Fortis gives immediate conviction of this error; for not even this nor any other of them will make the leaſt ebullition or effervеſcence with that menſtruum, with which it is well known Chalk wou'd raiſe a moſt violent one; this is the uſual appearance of this very extraordinary ſtone, but like the reſt it is ſubject extreamly to vary from this, frequently the whole matter of the ſtone makes but one equal maſs, cover'd by this thick white coat, and looking ſo oddly when broken, as to be rather taken for a colour'd Flint than a Pebble; ſometimes the ſeveral matters of it are run into concentric narrow circles like the Agates, without any Nucleus at all, and ſometimes they are in ſeparate blotches, as is the caſe with the former ſpecies; in all theſe varieties the ſtone however keeps its natural fine ſtructure, brightneſs and tranſparency; but there is another accident it is ſubject to, which robs it even of theſe, this is its having taken up into its maſs part of the matter of its cruſt; this is not unfrequently the caſe, and where it happens, ſo debaſes the ſtone, and renders it ſo coarſe, dull and opake, that it is not eaſily known. It is naturally more tranſparent than moſt of the other Pebbles; it breaks with a fine, even, flinty ſurface, and is very hard and capable of an elegant poliſh.

Examin'd by the Microſcope, it appears of a fine flinty texture, and leſs debas'd by additional earth than moſt ſpecies; its cruſt is a coarſe, opake maſs, of a lax, ſpungy texture, and having much more of the appearance of an earth than of a ſtone.

The ſtone itſelf very freely gives fire with ſteel, the coat not without much difficulty from the ſmall quantity of Cryſtal it contains, as its earth can have no ſhare in producing that effect.

Neither of them will at all ferment with Aqua Fortis.

It is a very rare and uncommon ſpecies, I have found it once or twice in Hertfordſhire, but never met with it in the neighbourhood of London; the places where it is plentiful, if it can any where be ſaid to be ſo, are the Yorkſhire ſhores, on which it is often found looſe, tho' I never yet cou'd diſcover a piece of it lodg'd in the cliffs; which is ſingular as almoſt all the other maſſes found there are, beat out from thence by the waves in ſtorms.

24. *Calculus nucleo albicante, cruſtis albis & fuſcis.*
White center'd Pebble, with white and brown Cruſts.

This is a very elegant Pebble, tho' of no farther variety than what it has from two colours. It is of an extreamly fine, cloſe and compact texture, of a very rough and uneven ſurface, not only deeply wrinkled, but having a number of ſmall excreſcences, or roundiſh prominences like warts, and generally a multitude of ſmall irregular cavities on parts of it. It is generally of a compreſs'd, orbicular or oblong form, and is often two or or three inches long and nearly as broad; it is compos'd of a central Nucleus of a fine bright but not very clear white, which is ſurrounded with a greater or leſſer number of cruſts, or circular concentric veins, ſometimes ſix or eight, ſometimes only three or four, and only of two colours, a fine deep brown, and a very bright white like that of the Nucleus; the brown being generally much the broader and thicker; a narrow circle of deep brown always immediately ſurrounds the Nucleus, and that is ſucceeded by a narrow one alſo of white, they are diſpos'd after this in a regular alternate order on one another; but tho' the white generally continue the ſame narrowneſs the firſt has; the brown become very thick and broad, and the outer cruſt, which is ever of brown, is often much thicker alone than all the white ones put together; over this lies the common coat, which is generally of a blueiſh grey, the little wartlike prominences being always bluer than the reſt; this is the general habit of the ſtone, but it is very frequent to find the Nucleus wanting, and the white matter diffus'd in form of irregular veins like the Agates. The brown parts of this ſtone is very bright and gloſſy, and moderately tranſparent, the white much more opake; one wou'd naturally imagine the white parts of a variegated ſtone ſhould be generally the cleareſt, but on the contrary it is almoſt a general rule, that they are the moſt opake; the darkneſs of all theſe ſtones is owing to the Earth they are adulterated with, and the white earth which commonly gets into theſe, ſeems moſt to cloud and render them opake of any colour. The ſpecies in general is of the brightneſs and tranſparence of the finer Pebbles; it breaks with a fine, even, gloſſy ſurface, and is extreamly hard and capable of an elegant poliſh.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a duſky reddiſh grey.

Examin'd by the Microſcope, it appears very gloſſy and of a fine ſurface in both parts, but very differently tranſparent; in the brown parts it is conſiderably ſo, in the white veins very little, and in the Nucleus often not at all; the brown is of the cloudy or curdled texture ſo frequent in the Pebbles, but the white ſeems rather one equal maſs regularly tho' very highly debas'd with its Earth.

It is very ſeldom found about London, but is very common in many parts of the kingdom; the gravel pits in Leiceſterſhire and Northamptonſhire afford it almoſt univerſally, but the greateſt quantity I ever ſaw of it is in the ford over the river Nen, two miles above the City of Peterborough.

25. *Calculus nucleo rubenti, cruſtis nigris, albidis & carneis.* *Red center'd Pebble, with black, white and fleſhcolour'd cruſts.*

This is one of the more beautiful of the Engliſh Pebbles. It is of an extreamly cloſe, compact and fine texture, of a very remarkably ſmooth and even ſurface, without prominences and cavities, and with fewer and thoſe more ſlight and ſuperficial wrinkles than almoſt any kind beſide; it is generally of a very regularly orbicular ſhape, ſometimes a little compreſs'd, and is never, ſo far as I have yet obſerv'd, found very large, the biggeſt ſpecimen I have ſeen of it not exceeding three inches in diameter; it is compos'd of a very beautiful and generally pretty large, red central Nucleus, beautifully ſurrounded with a number of thin cruſts, of a fine jet black, a clear white and a fleſh colour, a black circle generally immediately ſurrounds the Nucleus; next that uſually lies a fleſh colour'd one, then either a black or white uncertainly, and afterwards the reſt in alternate order, tho' not always perfectly regularly ſo, to the number of ten, twelve, or more; the outer cruſt is generally of fleſh colour, and over that the common coat is very thin. The Nucleus of this ſtone is not only of a fine red, but is very bright and pellucid, and indeed equal to many of the finer Carnelians; the fleſh colour'd veins, which are only of the ſame ſubſtance become paler, one would imagine ſhould be more pellucid and bright, but, on the contrary, they are, in reality, the dulleſt, and moſt opake part of the ſtone; the truth of this is, they are rendered paler, not by their having a ſmaller quantity of the red earth to which the Nucleus owes its colour, but by having a very large admixture of a white one; I have before had occaſion to obſerve, that none of the adulterating earths of ſtones, render them ſo opake as the white; and 'tis thence no wonder, that this part of this ſtone which is the only one that has much of it in it, ſhould be more dark and opake than the reſt; the white veins are of a pearly caſt, and much more pellucid than the red, and have ſomewhat of the look of the Agates, as have all thoſe parts of Pebbles which have this peculiar blueiſh white caſt; the white earth in them, if the ſame with that in the other white ones, which from their different tinge is much to be doubted, being certainly in much ſmaller quantity; the black cruſts are extreamly beautiful, they are of a fine dye, very bright and gloſſy, and in thin pieces have no ſmall tranſparence; the varieties of this ſpecies, from the different diſpoſition and admixture of its ſeveral parts, are like thoſe of the other ſpecies of Pebbles; ſometimes, however, it loſes nothing of its beauty by theſe, but by the leſs orderly diſpoſition of its variegating matter and want of a central Nucleus, it very beautifully imitates the Agates; one accident, however, there is, which, tho' it frequently happens alſo to the other ſpecies, is in none ſo often ſeen as in this, that is, inſtead of a central Nucleus and concentric circles of cruſts, it is form'd upon a broad, flat, red baſis, plainly of the ſame ſubſtance and texture with the common Nucleus; and the variegating matter is diſpos'd half round this in very regular and orderly ſemi-circles from edge to edge, but no part of it having got below either of the edges; this is very eaſily accounted for however, ſince nothing can be more plain than that if a ſmall central Nucleus were plac'd, as is ever the caſe here, in or near the center of a plain flat plate, and matter to be added at different times in form of cruſts to that Nucleus, the cruſts it form'd could be no other than regular ſemi-circles, extending from the top of the Nucleus every where to the ſurface of the plate, farther than which it was impoſſible for them to go; this is evidently the caſe in this accidental variety of this and ſome other of the ſpecies; and the whole hiſtory of it is, that a large maſs of plain matter ſubſided firſt, and remain'd at reſt on the ſtratum that was at that time the bottom, to this from among the waters, above a ſmall nodule generally of the ſame matter affix'd itſelf, and round this the other incruſtations were made both itſelf, and its flat baſis remaining abſolutely at reſt.

This ſpecies is in moſt parts as pellucid as the very fineſt of our Pebbles, it breaks with a fine, even, flinty ſurface, and is extreamly hard, and capable of an elegant poliſh.

It very freely and readily gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a mix'd grey.

Examin'd by the Microſcope, it makes in its different parts a very different appearance; its Nucleus appears of a fine bright red, a little curdled in its texture, but very pellucid, the black loſes much of its colour, and appears tolerably pellucid, of a fine ſmooth texture, and of a pale grey; the white or pearl colour has very much of the colour and miſty look of the ordinary Chalcedony, and ſhews its adulterating earth in ſmall disjunct Moleculæ; the fleſh colour'd veins or cruſts are moſt opake of all, but they are notwithſtanding that, very bright and beautiful, they are extreamly ſated with a pale fleſh-colour'd earth, probably owing to the red earth of the Nucleus, mix'd with a white, but this is beautifully diſpos'd in millions of elegant round ſpots.

It is a very rare ſpecies; I have once ſeen it on Hampſtead-Heath, and two or three times in the gravel pits of Northamptonſhire; on the ſhores about Scarborough it is ſometimes found, but never in any great plenty; it were to be wiſh'd for the ſake of our lapidaries, that it were more common.

26. *Calculus nucleo flavo, cruſtis flavis & albo-virentibus.*
Yellow center'd Pebble, with yellow and greeniſh white cruſts.

This is an extreamly elegant and beautiful ſtone; it is of a very fine, ſmooth, cloſe and compact texture, of a remarkably even ſurface, ever without inequalities, and commonly with only a few, and thoſe very ſuperficial wrinkles: it is generally of a regular orbicular ſhape, ſeldom much compreſs'd, and generally between one and three inches in diameter; it is compos'd of a ſmall central Nucleus, of a fine texture, very gloſſy ſurface, moderately tranſparent, and of the colour of the common yellow Carnelian; ſurrounded with generally only a ſmall number of cruſts, diſpos'd in regular concentric circles, theſe are of no more than two colours, but thoſe ſo very different as to have a very happy effect in ſetting off one another; they are a yellow, generally a little deeper than that of the Nucleus, and a very elegant pale, or whitiſh green; a circle of the laſt colour ever incloſes the Nucleus, and on that a yellow one is laid, and afterwards a green one again, and ſo on in a regular alternate order to the ſurface of the ſtone; the yellow veins or cruſts, are generally broader than the green, and one of them broader than the reſt uſually is the outer cruſt, on which is ſpread the coat which is very thin, and of a pale browniſh white, tho' it ſometimes varies from that colour; this is the more regular and common appearance of the ſtone, but it varies from this, as do moſt or all the other Pebbles at times, into an irregular diſpoſition of the cruſts, the want of a central Nucleus, and the appearance of an Agate; it is very fairly pellucid in the Nucleus and yellow cruſts, and much more ſo in the green ones; and upon the whole, is one of the moſt pellucid of all the colour'd Pebbles.

It is extreamly hard, and capable of a very fine poliſh.

It freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a duſky grey.

Examin'd by the Microſcope, it appears of a very elegant texture in all parts, but is a little curdled in the yellow; in the greeniſh the adulterating earth is not only ſo ſmall in quantity, but ſo perfectly mix'd alſo, that the ſubſtance appears little inferior to an Agate.

It is a very rare ſpecies; I do not remember to have ſeen it any where unleſs upon the ſhores of Yorkſhire; were it more common it would be well worth the notice of our lapidaries.

27. *Calculus nucleo rubenti, cruſtis purpureis & pallide flavis.* *Red center'd Pebble, with purple and pale yellow cruſts.*

This alſo is an extreamly beautiful and elegant ſtone; it is of a fine, ſmooth and even texture, very compact, firm, and cloſe, and of a remarkably rugged ſurface, full of inequalities, and tho' mark'd with but few, yet thoſe very deep wrinkles; it is generally of a very rude, uncertain, and irregular ſhape, ſeldom much approaching to round, or ſcarce ever at all compreſs'd; its ſize is various, ſome ſpecimens having been found of four inches diameter, tho' the more frequent are of leſs than an inch: it is compos'd of a large, and generally irregularly ſhap'd central Nucleus, of a ſtrong, deep red, moderately bright and gloſſy, but with little tranſparence, ſurrounded by two or three, ſeldom more cruſts, ſome of a fine pale yellow, and others of a deep blackiſh hue, as they lie in the ſtone, but held up to the light in thin pieces, tolerably tranſparent, and of a fine deep purple; all parts of the ſtone are bright and gloſſy, but the yellow veins are the moſt tranſparent, a yellow cruſt generally immediately ſurrounds the Nucleus, and what follow that are laid in alternate order, and generally very broad or thick; a yellow one is alſo generally the external cruſt, and cover'd by the common coat, which is uſually very thick, and of a yellowiſh colour on the ſurface, but very white within, and ſeeming as if made up of chalk; this is the uſual appearance of the ſtone, but it is liable to all the varieties of the other Pebbles, and often is found not ill repreſenting a very elegant German Agate.

It is moderately tranſparent when cut into plates, and is very hard, and capable of an elegant poliſh.

It very freely gives fire with ſteel.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a mix'd reddiſh brown.

Examin'd by the Microſcope, it appears very different in purity and luſtre in its different parts; its Nucleus is of a good colour, but very opake, its yellow curdled in the manner uſual with Pebbles; and its purple has ſo much of the black hue of the Pramnion and Morion of the antients when look'd at in the maſs, and ſo much of the glowing purple of the ſame ſtone when cut into plates and view'd againſt a good light, that there is no room to doubt its being very much of the nature of that ſubſtance.

It is a very ſcarce ſpecies, a few ſpecimens of it have been found on the ſhores of Suſſex, and ſometimes it is found in the gravel pits about Oxford; were it to be had in any plenty, it would be a very fine ſtone for our lapidaries.

28. *Calculus nucleo flavo, cruſtis cinereis & pallide rubentibus.* *Yellow center'd Pebble, with grey and pale red cruſts.*

This tho' leſs beautiful than ſome of the former, is a very ſingular and remarkable ſpecies; it is of a moderately fine and compact texture, of a very ſmooth and even ſurface; ſubject to no inequalities, and with a great number indeed of wrinkles, but all ſlight and ſuperficial; it is generally of a very regularly orbicular form, ſeldom much flatted, and from one to ſix inches in diameter; it is compos'd of a duſky yellow Nucleus, ſurrounded by many thin cruſts of a pale red, plac'd alternately with broader and thicker, of a pale aſh-colour, or diluted blueiſh grey; all its colours, however, are faint, and dead, and its general texture much debas'd with earth, and but coarſe; its Nucleus is generally ſmall, the bigneſs of a hazel nut ſometimes ſerving as a baſis for a ſtone of the largeſt diameter; it is of an opake and curdled look, even viſibly ſo to the naked eye; the grey is much like the colour of ſome of the paler Flints, but more debas'd by earth, and conſequently more opake; and the fleſh-colour is evidently a red not made pale by an admixture of white, but of the grey of the other part of the ſtone; the grey generally makes the external cruſt, which is pretty broad and thick, and ſurrounded by the outer coat, which is ever thin, and of a pale blueiſh grey; this is the uſual and indeed the natural appearance of the ſtone, but it varies at times like the reſt from the different ſtate and admixture of its different ſubſtances, and frequently wants its Nucleus; in this and all the other ſpecies where the Nucleus is wanting, the variegating matter is never diſpos'd in cruſts, but inſtead of the leiſurely application of freſh matter at different times to a ſmaller maſs already form'd, is ever form'd by one ſimple concretion of the whole maſs at one inſtant; and the diſpoſition of the variegations, which are in theſe veins, and not cruſts, is ever the ſame with that of the Agates, and is owing to the ſame cauſe, the mere motion of the fluid it was originally found in. The ſtone in all parts is but coarſe and opake, but is conſiderably hard, and takes a better poliſh than from its external figure one wou'd be led to expect.

It freely gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It burns to a duſky greyiſh white.

Examin'd by the Microſcope, the grey parts appear of the curdled ſtructure ſo common to the Pebbles, the earthy matter in it being viſibly diſpers'd in ſmall cluſters of diſunited Moleculæ, the other colours are more loaded with earth, and conſequently more opake.

It is found in great plenty on the Yorkſhire ſhores, and ſometimes in our gravel pits.

29. *Calculus nucleo pallide cinereo, cruſtis rubris, purpuraſcentibus, ſubcæruleis & fuſcis.*

Pale-grey center'd Pebble, with red, purple, blueiſh, and brown cruſts.

This is a Pebble of more variety of colour than moſt ſpecies, but it wants the fine and pure texture ſome of them have, to make it ſhew them to an advantage. It is of a moderately ſmooth and even texture, and very firm and compact, of a ſurface much furrow'd with deep wrinkles, but free from any other inequalities, generally of a pretty regular orbicular figure, and commonly of about four inches in diameter. It is compos'd of a ſmall central Nucleus, of a pale grey, or whitiſh aſh colour, ſurrounded with a very remarkable number of thin or narrow cruſts, of great variety of colouring; ſome of them are of a ſtrong red, others of a fair and good purple, others of a greeniſh blue, and others of a fine gloſſy brown; theſe laſt are of the fineſt texture, and moſt brightneſs and tranſparence of any part of the ſtone; the reſt, tho' of very agreeable colours, have a coarſeneſs and duſky look, which greatly takes off from their beauty. The Nucleus is generally immediately ſurrounded by a ſomewhat broad circle of red, very much reſembling the matter of the ordinary red Pebble, but more foul'd with earth, and conſequently leſs bright and clear; next that is generally a circle of brown; as for the reſt of the cruſts, they are diſpos'd without the leaſt regularity, but make a very pleaſing and elegant variegation; the outer cruſt is generally of a blueiſh grey, and thicker or broader than the reſt; the coat which ſurrounds this is uſually very thin and whitiſh. It is a very elegant ſtone in this ſtate, but is liable to the ſame varieties with the reſt of the Pebble Genus, and when it wants the Nucleus, and has its variegations diſpos'd in the manner of the Agates, which is very frequently the caſe, makes often a yet more elegant figure than when they are rang'd in regular circles; in its more uſual and natural ſtate it has leſs brightneſs, and when cut into plates, leſs tranſparence than moſt of this Genus.

It breaks with a ſmooth flinty ſurface, and is conſiderably hard, and capable of an equal, tho' not perfect poliſh.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a mottled greyiſh reddiſh, and browniſh maſs.

Examin'd by the Microſcope, the different colours are all, except the brown, of pretty much the ſame degree of opacity, and appear highly ſated with earth; the brown has ſome tranſparence, and ſhews its earth in form of disjunct Moleculæ, giving a miſty look to the maſs.

It is a very rare ſpecies; I have once or twice met with it about Berkhamſtead, in Hertfordſhire, and in no other place that I can remember; if more common, it wou'd be worth the notice of our lapidaries; its great variety, wou'd make amends for its foulneſs.

30. *Calculus nucleo, nigricante, cruſtis nigris & albidis.*
Black center'd Pebble, with black and white cruſts.

This is a very beautiful ſpecies, tho' it never has any farther variety than from theſe two plain colours. It is of an extreamly fine, cloſe and compact texture, of a very rugged and unequal ſurface, generally full of deep wrinkles, and of large wart-like protuberances, often of the bigneſs of a horſe bean. It is uſually of a compreſs'd form, approaching to round, and frequently of four or five inches in diameter. It is compos'd of a moderately large central Nucleus, of a fine gloſſy black, ſurrounded by a vaſt number of alternate cruſts, of a beautiful blueiſh white, or pearl colour, and of the ſame colour and ſubſtance with the Nucleus; a narrow circle of pearl colour always ſurrounds the Nucleus, and alternate circles or cruſts of black, and of that make up the reſt of the ſtone. The white, however, are all very narrow, the others broad, and the outer one being ever of the black, and broader than the reſt, makes upon the whole the black look like the general baſis of the ſtone, and the white no more than a ſlight variegation. The coat which ſurrounds this outer cruſt, and covers the whole, is generally very thick, and of a coarſe chalky looking opake white ſubſtance. There are at times found inſtances of this ſpecies, like the reſt wanting the Nucleus, and having its white matter diffus'd in irregularly diſpos'd, but all concentric lines, as in the Agates, this having been the effect of the diffuſion of it, by the motion of the ambient fluid at its one general coaleſcence into a maſs; all theſe being, not as the Pebble would have been in its more natural ſtate, the effect of the ſucceſſive application of freſh quantities of matter in form of cruſts, but form'd by the concretion of all the matter that forms them at one inſtant of time, and into one maſs. Sometimes alſo we find a pale or darker grey ſtone, in a white thick cruſt, not well reducible to any other ſpecies, but a manifeſt variety of this from a more irregular mixture of its two differently colour'd ſubſtances; which in this caſe appear to the naked eye to conſtitute one ſimple ſubſtance, of a paler or darker grey; but examin'd more attentively, and with the help of glaſſes, this is generally diſcover'd to be made up of numberleſs Moleculæ of each colour, often running into one another, and ſometimes almoſt perfectly blended together. It is of more tranſparency than many of the other ſpecies.

It breaks with a very fine, even and gloſſy ſurface, and is extreamly hard, and capable of an elegant poliſh.

It very freely gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It burns to a duſky grey.

Examin'd by the Microſcope, it appears of an extreamly elegant ſtructure, and conſiderable tranſparence in both its colours; the white has much of the caſt of the blueiſh Agates, and the black view'd in the thin flakes proper for this ſort of examination, loſes ſo much of its colour, as to become of a pale grey, and very beautifully pellucid; but its debaſing earth is more viſible in clouds or ſmall Moleculæ than in the white.

It is not unfrequent on the Suſſex and Yorkſhire ſhores, but it has never yet happen'd to me to find it in digging. This and ſome other ſtones of different colours, and much of the texture of Flint, found in the ſame places, may make the young ſtudent in theſe things ſtart at my declaring that Flint is but one ſpecies; but it is to be conſider'd, That theſe differ from Flint according to certain and invariable rules and characters, to be ſeen under the general character of each Claſs; and that this is a genuine Pebble, and thoſe others are Agates, ſuch as we have in England.

I have more than once met with this ſpecies, wrought by our lapidaries into ſeals and other toys. It has much of the look of an oriental ſtone, and generally is honour'd with the name of an Onyx or Sardonyx, ſo careful and determinate are thoſe gentlemen in theſe things.

31. *Calculus nucleo flavo-fuſco, zonis fuſcis & cinereo-nigreſcentibus.*
Yellowiſh brown center'd Pebble, with brown and greyiſh black cruſts.

This is a Pebble, which is, if cloſely examin'd, another very beautiful one, tho' with very little variety of colour: at a diſtance indeed, and in its rough ſtate it is not very ſtriking; but ſome plates of it which I have ſeen poliſh'd, have equal'd moſt of the ſtones of this kind. It is of a conſiderably fine, ſmooth and compact texture, generally of a very rugged and unequal ſurface, very deeply wrinkled in the uſual manner of Pebbles, and full of large wart-like excreſcences. It is generally of a very compreſs'd, but orbicular form, and is from two to ſix inches in diameter. It is compos'd of a large browniſh yellow, or tawny central Nucleus, environ'd with a few, but thoſe generally very broad and thick cruſts, ſome of a greyiſh black, and others of a tolerably clear brown, but without the yellowneſs ſo conſtantly mix'd with the brown in the Nucleus: a circle of paler grey than the reſt generally immediately ſurrounds the Nucleus; after this the brown and darker grey lie alternately, and are generally of about the ſame breadth one with another, and very beautifully terminated at their edges, not running into one another, as the circular cruſts of many of the Pebbles do. The outer cruſt is ever of the brown, and generally is but thin, and the coat over that is likewiſe thin and blueiſh, but much paler colour'd on the protuberances than in the other parts. This ſpecies uſually keeps pretty regularly to this appearance, but is ſometimes found without a Nucleus, and with the agate-like diſpoſition of the variegations; and at others is confuſedly blended one part with another, and makes a dirty looking ſtone, of a mixture of both the colours. It is leſs tranſparent than many of the other ſpecies.

It breaks with an even and gloſſy ſurface, and is very hard, and capable of a fine poliſh.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a reddiſh grey.

Examin'd by the Microſcope, the blackeſt parts appear of a pale grey, the grey almoſt colourleſs, and both made cloudy by a large quantity of very minute earthy Moleculæ; the brown parts are more pure, of a more equal texture, and more pellucid than theſe, the Nucleus is of a ſmooth texture, but moſt opake of all.

It is not uncommon in the gravel pits of Hertfordſhire, Buckinghamſhire, and Northamptonſhire, but is very ſeldom ſeen about London.

32. *Calculus nucleo pallide cinereo, cruſtis albis & vireſcentibus.*
Pale-grey center'd Pebble, with white and greeniſh cruſts.

This is a very elegant Pebble, and tho' of very little variety of colour, is yet extreamly beautiful. It is of a moderately fine texture, and very firm and compact: of a ſmooth and even ſurface, very little ſubject to wrinkles, and not at all to any other irregularities. Its figure is almoſt conſtantly very round, and not at all flatted, and its ſize from one to three inches in diameter. It is compos'd of a ſmall orbicular central Nucleus, of a pale aſh-colour'd grey, ſurrounded with a conſiderable number of cruſts of two colours, ſome of a very pure white, without even the leaſt admixture of blueneſs, ſo common in the white cruſts of the finer Pebbles; and others of a pale greyiſh green, a faint, but not diſagreeable colour; a circle of white uſually immediately ſurrounds the Nucleus, and often the commiſſure between them is in a manner obliterated, and the whole has only the appearance of a grey ſpot, with a white edge; this is owing to their blending in ſome degree together, from their having been apply'd to one another, while both were yet very ſoft and moiſt; but tho' this has ſometimes happen'd, inſtances are alſo frequent in which the commiſſures are diſtinct, and the edges of both the Nucleus and firſt cruſt, perfectly determinate and very beautiful; the cruſts that ſucceed this, are plac'd in a beautiful alternate order, the white always the broadeſt, the greeniſh the narrower; ſometimes alſo theſe are blended in a great meaſure with one another, and have undulated edges running thro' one another to the ſucceeding cruſt, but more frequently they are very exact in their edges; and in that caſe it is, that the ſtone is moſt beautiful, the colours being all of a pale hue, and in ſome meaſure alike, and regularly parted from each other, making a very agreeable appearance. The outer cruſt of this is uſually of a paler, or greyer green than the reſt, and but thin, and the coat that covers it is very thin, and of a very pale blueiſh aſh-colour. It will be eaſily conceiv'd, from what has already been obſerv'd of the veins of this ſtone, ſo frequently running into one another, that it is no uncommon thing for them to be found abſolutely blended together, and forming one greyiſh ſtone, with a faint eye of green; this I have frequently ſeen, but never have happen'd to find it in the other common variety of the Pebbles, without a Nucleus, and with an Agate-like diſpoſition of its veins.

It is but moderately tranſparent for a good Pebble, and breaks with an even, but leſs gloſſy ſurface than many of the others, but is conſiderably hard, and capable of a tolerable poliſh.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a pale aſh colour.

Examin'd by the Microſcope, its Nucleus appears very opake; its white veins but much leſs ſo than that, but its greeniſh ones much more tranſparent, but clouded with multitudes of disjunct Moleculæ.

I have found it not unfrequently on the ſhores of the Thames in many places, and ſometimes in our gravel pits about Iſlington.

33. *Calculus nucleo albido-fuſco, cruſtis flavo fuſcis, & nigricantibus. Quæ Calculus Ægyptius vulgo.*

Browniſh-white center'd Pebble, with yellowiſh brown, and black cruſts. The Ægyptian Pebble of the Lapidaries.

This is well known to be an extreamly beautiful Pebble, yet, to deſcribe it as a naturaliſt, one cannot but obſerve, that it is merely to the fineneſs of its texture, and elegant variety of the diſtribution of its different colour'd matter, that it owes its beauty; ſince many of the common Pebbles of our gravel pits have a much greater variety of colours.

It is of an extreamly cloſe and fine texture, of a leſs rough or wrinkled ſurface than that of many of our Pebbles, and uſually of an oblong figure, tho' often very irregular, and ſeldom compreſs'd or flatted; it is various in ſize, but its moſt uſual ſtandard ſeems about four or five inches in length. It is compos'd of a very irregularly ſhap'd central Nucleus, which is not leſs irregular and uncertain alſo in ſize; this is however always naturally of a pale whitiſh brown, and is often itſelf vein'd or ſpotted with a duſky colour'd ſubſtance, and frequently variegated with Dendritæ, or delineations in black, of trees, ſhrubs, moſſes, &c. It is ſometimes very ſmall, but more frequently conſiderably large, and ſpreads ſo variouſly in the center of the ſtone, as often to repreſent the rude figure of a beaſt, fiſh, or the like, or part of ſuch figure; nay, ſome have been found with their edges ſo oddly circumſcribed, by the firſt ſurrounding cruſt, as to repreſent portraits of the human face; and Sir Hans Sloan has one in his poſſeſſion, with not only a human face, but with the very lineaments of the pictures of the old Engliſh poet Chaucer; and this ſo little the effect of imagination or prejudice in the obſerver, that ſtrangers, who have known nothing of this having been before obſerv'd there, if they have known any thing of the pictures of Chaucer, have declar'd it immediately to be the head of that poet. Sometimes however the Nucleus has nothing of this irregularity, but is merely a round or oval one, like that of the common Pebbles; the diverſities of the out-lines of this, however, and the accidental delineations in black in it, make a great part of the beauty of the ſtone; and theſe laſt, which are merely the effect of water or vapours, pervading accidental cracks in the ſtone, are not only found in the Nucleus, but interſecting alſo the matter of the cruſts: the Nucleus is uſually ſurrounded immediately by a moderately thick cruſt, of a pale browniſh yellow, that by a very ſlender and narrow one of black, ſeeming only a ſhadow to it, and theſe alternately by a vaſt number of other cruſts, partly black, and partly of a deeper or paler yellow: among theſe it is not uncommon to ſee one or more cruſts of the ſame matter with the Nucleus, and all theſe are cover'd finely with the common coat of the ſtone, which is of a deep, and ſomewhat duſky brown.

The central Nucleus, and all the cruſts are in this ſtone, of much the ſame degree of purity; the black, if any thing, are indeed a little finer than the reſt: This is the uſual diſtribution of the matter in this ſpecies, but it is liable to all the variations of the common Pebbles, and often becomes, by means of thoſe varieties, extreamly beautiful.

It breaks with a very even and gloſſy ſurface, and is extreamly hard, and capable of an elegant poliſh.

It very freely gives fire with ſteel.

It does not in the leaſt ferment with Aqua Fortis.

It burns to a browniſh grey, with a ſmall admixture of reddiſhneſs.

Examin'd by the Microſcope, it appears more pure, fine, and tranſparent than any other Pebble; but of all its parts, the Nucleus ſeems the moſt, and the black cruſts the leaſt ſated with earth.

It is found in vaſt plenty in Ægypt and Arabia, and in Siphanto, and ſome other Iſlands of the Archipelago: In Germany alſo, and in ſome parts of Suſſex, in our own country, we have the ſame ſpecies, but both ours and the German always want much of the beauty of the Ægyptian; there are vaſt quantities of it poliſh'd in Ægypt, but thoſe work'd here ever carry much the brighteſt poliſh, and are moſt valuable.

34. *Calculus nucleo, ſordide-virente, cruſtis flavis, & pallide fuſcis.*
Deep green center'd Pebble, with yellow, and pale brown cruſts.

This is a Pebble of very beautiful variegation, but it wants the luſtre and purity of ſome other ſpecies, to ſhew it to proper advantage; it is of a ſomewhat coarſe, rough, unequal texture, yet conſiderably compact and firm, of very ſmooth, equal, and regular ſurface, wrinkled but in few places, and never ſhewing any thing of the protuberances ſo frequent in many of the other ſpecies; it is generally of a very regularly orbicular ſhape, and from one to four or five inches in diameter; it is compos'd of a large central Nucleus, of a very ſtrong, but duſky green, ſurrounded by cruſts, ſometimes more, at others fewer in number, and of very different breadths or thickneſſes, and ſome of them of a ſtrong yellow, others of a pale whitiſh brown; theſe are diſpos'd in alternate order, a whitiſh, or very pale one, generally immediately ſurrounds the Nucleus, and the outer cruſt is uſually of the yellow, and conſiderably thick; the coat that ſurrounds this is always whitiſh, and of a chalky look, but not ſo thick as the cruſts of that colour about the Pebbles uſually are; it is at times found without a Nucleus, and its variegations diſpos'd, as in the like caſe in the other ſpecies, in form of the veins of the Agates, and ſometimes it has its whole conſtituent matter blended into a greyiſh green maſs: The whole ſubſtance of the ſtone has a dull, duſky, and ſomewhat coarſe look.

It breaks with a leſs ſmooth and equal ſurface, than the finer ſpecies before deſcrib'd, yet is conſiderably hard, and capable of a poliſh that adds very greatly to its beauty.

It very freely gives fire with ſteel.

It does not at all ferment with Aqua Fortis.

It burns to a pale fleſh colour'd grey.

Examin'd by the Microſcope, every part of it appears of a coarſe, obſcure, and opake ſtructure; the Nucleus is not tranſparent, even in the thinneſt pieces, and the yellow, which is the moſt pure of any part, is only a little faintly ſo at its edges; one would be amaz'd, from this view of it, that it ſhould be capable of any tolerable poliſh, yet ſo it is, that it makes a very pretty figure when wrought, and has more brightneſs than could be expected, tho' no tendency to tranſparence.

It is found in ſome of our gravel pits, but is a very rare ſpecies; I have two or three times ſeen it on Hampſtead Heath, and once about Kenſington, but in no other part of the kingdom that I know of.

FOSSILS

NATURALLY and eſſentially compound, not inflammable nor ſoluble in water, found in detach'd maſſes, and form'd of cryſtalline matter debas'd by earth.

Series the third.

Claſs the fourth.

CONISSALÆ.

Stones of a differently debas'd cryſtalline matter, but always found in form of ſmall and diſunited particles, great numbers of which being amaſs'd together, make a kind of powder.

Of this Claſs there are two Orders, and of each of theſe only one Genus; tho' each ſubject to very large ſub-diſtinctions into Sections, according to the adventitious matter mixed among the various Species of it.

Order the firſt.

Coniſſalæ, found in form of a naturally regular and uniform powder, all the genuine particles of which are either exactly, or nearly of one determinate ſhape, or all have a plain tendency to one and the ſame figure; appearing naturally and regularly concreted bodies, and not fragments of others once larger.

Order the ſecond.

Coniſſalæ, found in form of a rude, irregular and ſhapeleſs powder, the particles of which are never of any determinate ſhape, or have any tendency to any one particular figure, but ſeem all rudely broken fragments of ſome once larger maſſes.

CONISSALÆ.

Order the firſt.

Genus Unicum. ARENÆ. *Sands. Foſſils found in minute maſſes, forming together a kind of powder; the genuine particles of which are all of one determinate ſhape, and appear compleat and regular concretions, not to be diſſolv'd or diſunited by water, or form'd into a coherent maſs with it, but retaining their figure in it; tranſparent, vitrifiable by a ſtrong fire, and making no efferveſcence with Acids.*

Theſe are ſubject to be variouſly blended with homogene or heterogene matter, as that of the Talcs, &c. in ſmall particles, and are hence, as well as from their various colours, ſubject to the ſub-diſtinctions of various Sections.

CONISSALÆ.

Order the ſecond.

Genus Unicum. SABURRÆ. *Gritts. Foſſils found in minute maſſes, forming together a kind of powder; the ſeveral particles of which are of no determinate ſhape, nor have any tendency to one particular figure, but ſeem the rudely broken fragments of larger maſſes: not to be diſſolv'd or diſunited by water, but retaining their figure in it, and not cohering by means of it into a maſs conſiderably opake: calcining into lime in the fire, and in* *moſt of the ſpecies fermenting with Acids; often foul'd with heterogeneous matters, and not unfrequently taking in the coarſer, ſtony, mineral, and metalline particles; and hence, as well as from their ſeveral colours, ſubject to various ſub-diſtinctions into Sections.*

The obvious characters of all theſe bodies are therefore the hardneſs, and the firm coherence of their conſtituent particles, and their being form'd into very ſmall maſſes.

By the laſt of theſe alone, they are diſtinguiſh'd from all other Foſſils; tho' in their nature, texture and conſtituent particles, they perfectly agree with ſeveral ſpecies of them.

The general inaccuracy of the world has hitherto confounded together all the ſubſtances of this Claſs, by calling every thing in form of powder, Sand.

Dr. Woodward, indeed, has ventur'd to diſtinguiſh in ſome degree between them, and it is very evident to an accurate obſerver, that there are two abſolutely diſtinct ſets of bodies found in this form.

If we might allow a diſtinction of Genera from accidental varieties and admixtures of foreign bodies, we might indeed eſtabliſh as many Genera as the World has hitherto known ſpecies of the Coniſſalæ, but theſe are to be rejected.

Sea Sand, if not the ſame with the land ſorts, is either a maſs of powder'd animal, and vegetable ſubſtances, ſhells and corals, or a common Sand debas'd by an admixture of theſe; and the common duſt of the ſtreets, and highways, is among the Coniſſalæ, what the common vegetable mould is among earths, being no diſtinct Foſſil, but a mixt maſs of fragments of earth, ſtone and other Foſſils, with a thouſand heterogene admixtures.

Setting aſide theſe, therefore, the Coniſſalæ, or hard Foſſils found in or on the ſurface of the earth in form of powder, are here divided into two Orders, the Arenæ, properly ſo call'd, and the Saburræ; the true Sands, and the diſunited Gritts, or looſe particles of ſtone.

The firſt of theſe have been ever ab Origine in their preſent form; the other have many of them plainly, and poſſibly all been once concreted together, and in form of ſtone; and they are ever diſtinguiſhable accordingly from one another by the apparent uniformity, and extream uncertainty and irregularity of their conſtituent particles.

The character of the firſt of theſe Orders, is fix'd, certain and invariable; no one of the ſpecies being ever found to recede from any article of it unleſs on occaſion of adventitious mixtures, which are the moſt common indeed among theſe of any ſet of Foſſils, but are always to be diſcover'd by a ſlight inſpection.

The ſecond Genus are ſo various a ſet of bodies, that it was not eaſy to fix any character for them all, that could hold thro' all the tryals of fire and acids; the firſt article of it, however, which is conſtant to them, will always be ſufficient to diſtinguiſh them from the Sands; the others they agree with, or recede from, in different degrees, according to the nature and texture of the ſtones they belong to.

The diſtinctions of the ſpecies of theſe Genera, are to be made from an accurate obſervation of their fineneſs or coarſeneſs in the maſs, their weight, colour and brightneſs, the uniformity or irregularity of their particles, their feeling harſh or ſoft to the touch, and their containing or not containing earthy particles, which is diſcoverable by ſhaking them up in a vial of water, and letting them ſubſide.

Theſe are the more obvious and eaſy diſtinctions among the ſpecies, but there are others always pleaſing, and often neceſſary, eſpecially among ſuch ſpecies as ſeem moſt to reſemble each other; theſe are their appearance before the Microſcope, and the effects of acids and of fire on them.

By theſe the ſpecies will always be certainly diſtinguiſh'd, and on the effects of theſe are all the following deſcriptions of the ſpecies form'd; it may not be improper to obſerve to the young ſtudent here, that the laſt of theſe ſets of trials are far from being either troubleſome or difficult; the only Microſcope I have us'd, as alſo the particular acid and degree of fire, it may not be improper to mention here, not only for the ſake of the young enquirer, but of any other who may be deſirous to follow me thro' the experiments; the Microſcope was that with the poliſh'd Speculum, and the glaſs the ſecond magnifier of that Apparatus, as made by Mr. Cuff; the acid I choſe to employ, was Aqua Fortis; a thing always at hand, and as made from different ſalts more proper for theſe uſes than the ſpirit, or oil of any one alone; and the degree of fire no other than that of a common coal fire, in which the ſubſtance to be try'd was kept red hot for a quarter of an hour in the head of a clean tobacco-pipe.

To this it may be added, that the tryal by ſhaking up in water, is appropriated only to Sands taken out of the ſtrata, ſince it ſerves no other purpoſe than the ſeparating what extraneous earthy matter happens to be among the arenaceous; and the ſame Sand after two or three trials of this kind, if the muddy water be poured off before it have thoroughly ſettled, will no longer ſhew that it has this quality; it is plain that the Sands found on the ſhores of rivers have undergone this operation ſo often from the motion of the water, that they muſt have been very ſoon incapacitated for ſhewing this mark of diſtinction in our tryals, whatever might have been its natural condition.

The Microſcope is unqueſtionably the ſureſt and moſt valuable teſt of theſe bodies; this ever ſhews clearly their ſtructure, and the true ſhape of their particles; there is but one thing in which it is apt to miſlead, and that is in regard to colour, all the Sands being but ſlightly ting'd, and this ſort of inſpection making their colours ever appear paler, and where they are naturally very pale, ſhewing us the particles as if wholly colourleſs. This is a natural effect of all glaſſes that magnify, as we call it, in any great degree, and when once named will be of no conſequence in our reſearches.

If there was ſome difficulty in the preceding Claſs, from the various and inaccurate deſcriptions left us by other authors of the Pebbles; there is in this a no leſs formidable one of another kind, no author having deſcrib'd theſe at all, and few having even thought them worth a name in hiſtories of Foſſil bodies; the work therefore is here abſolutely new, but being founded on the ſubſtances themſelves, cannot be leſs certain than if before deliver'd by a thouſand authors.

SERIES III.

CLASS IV. ORDER I. GENUS I.

ARENÆ. SANDS.

Foſſils found in minute maſſes, forming together a kind of powder, the genuine particles of which are all of one determinate ſhape, and appear compleat and regular concretions, not to be diſſolv'd or diſunited by water, or form'd into a coherent maſs with it, but retaining their figure in it, tranſparent, vitrifiable by extream heat, and making no efferveſcence with Acids.

Theſe are ſubject to be variouſly blended with homogene or heterogene particles, as thoſe of the Talcs, &c. and are hence ſubject to the ſub-diſtinctions of various Sections, as well as from their various colours.

SECT. I. The White Sands.

A. White Sands which are pure, and free from heterogene or adventitious particles.

1. *Arena ſplendida, tenuis albicans.*
Fine, ſhining, white Sand.

THIS is the Sand commonly employ'd to throw over writing, and as it is on that occaſion common every where, well known to all perſons, and always at hand, is moſt proper of all others to make a kind of ſtandard by which to judge of the reſt; a Sand therefore compos'd of particles of about the ſame ſize with thoſe of this, will be in the following deſcriptions, call'd ſimply fine, *Tenuis*, as this is; thoſe of much ſmaller particles finer, or very fine, *Tenuiores* or *Tenuiſſimæ*; and thoſe of coarſer or very large particles coarſer, or very coarſe, or large, *Craſſæ*, or *Craſſiſſimæ*.

The brightneſs of the others will be in the ſame manner determin'd comparatively, as more or leſs than that of this ſpecies, as alſo their weight.

This is a Sand generally found abſolutely pure, of a tolerably clear white, and conſiderably bright and ſparkling, compos'd of fine particles, ſeemingly regular in ſize, none appearing to the naked eye much larger or ſmaller than the reſt; and of conſiderable hardneſs. It feels moderately rough or harſh between the fingers; and when thoroughly mix'd with water by ſhaking together in a vial, ſettles very quick, and leaves only a ſlight muddy whitiſhneſs in the liquor.

View'd by the Microſcope it appears compos'd of irregularly ſhap'd particles, of very different figures and ſizes, ſome approaching to round, but all having a manifeſt tendency to angular figures. They are all perfectly white, part of them ſomewhat opake, and part perfectly pellucid as white glaſs or Cryſtal.

It makes no effervеſcence with Aqua Fortis.

It acquires a pale tinge of reddiſhneſs or fleſh colour in the fire.

It is found in many parts of England in ſtrata of great depths, commonly pure while in the bed, but often foul'd with particles of yellow Sands of the adjacent ſtrata in the digging.

It is of common uſe about writing, and is of no ſmall ſervice in the glaſs trade, much of the white glaſs of England being made with it. Sands in general make a glaſs inferior to that from Flints, but are ſo much eaſier had, and leſs expenſive or troubleſome in the working, that they are generally us'd; the Flints requiring a tedious and laborious proceſs of calcining and powdering before they can be us'd, and theſe requiring no previous preparation, provided they are clean.

Another uſe of this, and of the Sands in general, is their ſerving for a kind of manure to ſtiff clayey lands; in Norfolk I have obſerv'd this practis'd with great ſucceſs; and in ſome other places, where the ſoil being too cloſe and compact, is by an addition of Sand kept looſe and diſunited, and capable of receiving rains into its body, and affording nouriſhment to plants.

2. *Arena ſplendidior, alba, craſſa.*
Large, ſhining, white Sand.

This is a ſomewhat coarſe Sand, conſiderably heavy, and generally found pure. It is of a good clear white, and very bright and ſparkling, compos'd of ſeemingly very regular and uniform particles, conſiderably hard, and very harſh and rough to the touch. Mix'd in water it ſettles immediately, and leaves no foulneſs or muddyneſs in it.

Examin'd by the Microſcope it appears compos'd of very uniform particles, all much of the ſame ſize, and all tending to an oblong and irregularly angular ſhape, perfectly white, of very ſmooth ſurfaces, and all tranſparent as white glaſs.

It makes no effervеſcence with Aqua Fortis.

In the fire it acquires a very ſlight, and ſcarce perceptible bluſh of fleſh colour.

It is found in moſt parts of the kingdom, and much valu'd by the glaſs men; a vaſt quantity of it is brought up to London continually from Maidſtone, and other parts of Kent; and moſt of the white glaſs, commonly call'd flint glaſs of London, is made with it.

3. *Arena albiſſima, ſplendidiſſima, tenuior.*
Fine, white, ſhining Sand.

This is greatly ſuperior to all the white genuine Sands in beauty. It is always found perfectly pure, is conſiderably heavy, of a very fair clear white, and moſt remarkably bright and ſhining. It is compos'd of fine, ſeemingly very uniform particles, of very even ſurfaces, and great hardneſs. It feels very harſh and hard between the fingers, and thrown into water, ſinks in it immediately, without imparting the leaſt muddyneſs to it.

Examin'd by the Microſcope, it affords a moſt pleaſing object, the particles are all very much of the ſame ſhape and ſize, all approaching to an oblong figure, irregularly angular, and often very much approaching to the form of ſmall hexangular Cryſtals; it is almoſt perfectly pure, and tranſparent, not like the glaſſy white tranſparency of the former Sands, but of a fine clear water, and ſcarce at all inferior to the pureſt or brighteſt Cryſtal.

It makes no effervеſcence with Aqua Fortis.

It burns to a very beautiful pale red.

Theſe three ſpecies are all compos'd of Cryſtal, debas'd by only a very ſmall admixture of white earth, and this has extreamly little of it.

It is found on the ſhores of moſt of the rivers in Italy, and in no other place that I have yet heard of. It is extreamly valu'd in glaſs-making, and accounted not at all inferior to flints.

By candlelight this Sand glitters like a congeries of ſmall diamonds.

Dr. Woodward, (to whom the preſent age owes more true knowledge in regard to Foſſils, and to whom I wiſh I was not oblig'd alſo to obſerve, that it owes more errors than to any one who ever wrote) has too haſtily determin'd the Sands in common uſe about London, to be no other than very ſmall Pebbles. It is very certain, that many of our common yellow Sands, and ſome of our white ones, are what may be call'd in a looſe way of ſpeaking, a ſort of Pebbles without cruſts; but it is no leſs certain, that this elegant Sand, and a multitude beſide this, are compos'd of particles of an abſolutely different kind; cryſtalline matter in angular pieces being one common conſtituent of them: and that the Saburræ, hereafter to be deſcrib'd, conſiſt of particles as different from any of theſe, and from thoſe of one another, as the particles of the ſtones they reſemble; which are of all kinds from the oriental Porphiry and Granite, to the ſorrieſt Sand ſtone of England.

This Sand ſeems to have been mix'd either naturally, or elſe in the working in the earth of the Roman potteries; their urns found to this day are frequently full of ſmall glittering ſpangles on their ſurfaces, which have been imagin'd by Sir Thomas Brown and others, to be the remains of a ſilvering antiently laid on their ſurfaces. But which are in reality no other than particles of a fine cryſtalline Sand: this Moreton has very juſtly obſerv'd, and I find it ſtrongly confirm'd by experiment, having pick'd out of the ſurfaces of theſe veſſels, ſeveral angular particles of this very ſpecies of Sand.

4. *Arena tenuior, albo-fuſca, hebes.*
Browniſh-white, fine, dull looking Sand.

This is a very pure, but not beautiful Sand, of dead, dull, unpleaſant white, with ſome mixture of a faintiſh brown, and conſiderably heavy; it has little or no ſhining or brightneſs to the naked eye, but appears a heap of fine duſt, compos'd of particles ſeemingly very regular and uniform as to ſize and ſhape. It feels very hard, tho' fine between the fingers, and ſhook in water, ſettles not ſo quickly as any of the former, and leaves a little whitiſh muddyneſs in it.

View'd by the Microſcope, it appears compos'd of particles of very different ſhapes and ſizes, but moſtly approaching to a roundiſh figure; many of them of rough ſurfaces, and ſeveral flattiſh, but all more or leſs tranſparent, ſome particles being as perfectly ſo as white glaſs. The Microſcope ſhews nothing to which the browniſh colour can be owing.

It makes no efferveſcence with Aqua Fortis.

It burns to a ſomewhat paler colour, but without any tendency to redneſs.

This is a very common Sand in France, and all their thin green glaſs is made with it; we are not without it in England, Suſſex and Kent both abound with it; but as we have ſo many better Sands, it is never us'd with us in the glaſs trade.

5. *Arena tenuior, albo-flaveſcens, hebes.*
Yellowiſh-white, fine, dull Sand.

This is a very pure and fine Sand, conſiderably heavy, and of a yellowiſh white colour, without the leaſt brightneſs, or unleſs nearly view'd, the ſmalleſt ſhining particle. The particles it is compos'd of are very minute, and ſeemingly very uniform and regular; they ſeem, however, leſs hard than thoſe of ſome of the other Sands, and feel not only very fine, but conſiderably ſofter than thoſe of moſt other Sands between the fingers. Shook together in water, it ſettles very quickly to the bottom, but leaves a conſiderable yellowiſh muddyneſs in it.

Examin'd by the Microſcope, it appears compos'd of irregularly ſhap'd ſmall particles, moſtly approaching to round, many of them of rough ſurfaces, tho' ſome of perfectly ſmooth; tranſparent in different degrees, and differently ſtain'd with a pale browniſh yellow, ſome of the particles having it more deeply, ſome more faintly, and others being quite colourleſs.

It makes no efferveſcence with Aqua Fortis.

In the fire it acquires a pale yellowiſh red.

It ſeems to be a Sand ſcatter'd throughout all the world, the deſarts of Africa are in many places cover'd with it; I have receiv'd it among other things from Italy, from France and from the Weſt Indies. In England it is found in ſome of our pits, and frequently on the banks of rivers, where being thoroughly waſh'd, it appears of a paler colour and ſomething bright. It may not be improper to mention, on this occaſion, that many of our Sands are ſubject to the ſame ſort of alteration by water in the ſame manner, and if not carefully attended to, may lead a young obſerver into the making many imaginary new ſpecies.

6. *Arena tenuiſſima, ex albo carnea, hebes.*
Reddiſh white, very fine, dull Sand.

This is a very pure and extreamly fine Sand, moderately heavy, and of a pale whitiſh colour, with an extreamly ſmall bluſh of reddiſh or fleſh colour, and without the leaſt ſhining or brightneſs, appearing only like a heap of duſt of that colour; the particles that compoſe it are extreamly minute, ſeemingly all of a ſize; and notwithſtanding their remarkable ſmallneſs very conſiderably hard, and feel harſh and rough in rubbing between the fingers; ſhook up in water it very ſlowly ſubſides, but when ſettled leaves ſcarce any muddyneſs in it.

Examin'd by the Microſcope, it appears compos'd of a multitude of particles of all ſhapes, figures and ſizes, ſome roundiſh, ſome angular, and many of rough ſurfaces; ſome of its conſtituent particles are at leaſt twenty times ſmaller than the reſt, tho' the largeſt of them are ſmaller than thoſe of moſt other Sands; all are more or leſs tranſparent, ſome of them very perfectly ſo, and none at all viſibly colour'd, the reddiſhneſs that appears in the maſs being too little to be diſtinguiſhable in any ſingle particle.

It makes no efferveſcence with Aqua Fortis.

It burns to a browniſh colour, but without redneſs.

This is a common Sand in the deſerts of Africa and Arabia, but is alſo found in other places; England is not without it, I have the very ſame ſpecies from Suſſex.

B. White Sands which are impure, containing arenaceous particles of other Colours.

1. *Arena ſplendida, albo-fuſca, craſſior.*
Large, browniſh-white, ſhining Sand.

This is a very beautiful Sand, but is render'd impure by an admixture of colour'd particles. It is conſiderably coarſe in regard to ſize, very heavy, and in colour of a pale duſky mixture of browniſh, yellowiſh, and ſomething of a faint reddiſhneſs with the white; it is very bright and ſparkling, and has a look of more than ordinary cleanneſs; its particles, tho' different in colour, ſeem all much of a ſize, it feels very remarkably hard and coarſe between the fingers, and ſhook in water immediately ſettles in it, and does not give it the leaſt muddineſs.

Examin'd by the Microſcope, it affords a very pleaſing object, the white particles which make up at leaſt four fifths of the maſs, are of irregular figures, but almoſt all of a ſize, and in general tending to an oblong figure, and have angular edges; among theſe are every where diſcover'd, a multitude of roundiſh particles, of a fine clear yellow, and a ſmall number of duſky, but very beautiful ones, of a pale fleſh colour; the white particles in this Sand are as perfectly pellucid, and of as fine a water as the pureſt Cryſtal; the yellow are very beautifully tranſparent, tho' they want the luſtre of the white, but the reddiſh are all in a great degree opake, and of a leſs ſmooth ſurface than the others; the various colour'd particles of this Sand are, however, very much of a ſize, and together make an uniform maſs, that to the naked eye does not readily diſcover its true colours.

It makes no efferveſcence with Aqua Fortis.

In the fire it burns to a very beautiful pale red.

It is found but in one place of this kingdom that I yet know of, which is at Hedgerley, near Windſor, where the great loam pits are, where the ſtratum of that valuable loam ends they find a bed of this Sand in its place, the loam by degrees loſing itſelf into it. I have ſeparated the Sand from that loam by waſhing, and find it to be the very ſame with this in all particulars; whence it ſhou'd ſeem that by finding a proper clay to mix with it, an artificial loam might be made on the ſpot, now the natural begins to fail, and perhaps ſomething not much inferior to it, with ſimilar clay and ſand from other places. The Sand next to be deſcrib'd approaches ſo much to it as to be worth trial.

2. *Arena ſplendida, craſſa, albo-flaveſcens.*
Large, yellowiſh-white, ſhining Sand.

This is a very beautiful Sand, and leſs impure than the former. It is conſiderably large and coarſe, tho' ſomething leſs ſo than that, very heavy, and appears in the maſs of a very pale yellowiſh-white; it is remarkably clean, and very bright and ſhining; its conſtituent particles ſeem pretty uniform in ſize; it feels very harſh and rough between the fingers, and ſhook up in water ſubſides immediately, without leaving any muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of particles of all ſhapes and figures, but much of the ſame ſize; they generally approach to roundneſs, are very few of them angular, and many flattiſh; they are in general white, of ſmooth ſurfaces, and of a cryſtalline water and tranſparency, tho' in a ſomewhat leſs degree than the former, and are interſpers'd with others of a fine pale yellow or lemon colour.

It makes no effervеſcence with Aqua Fortis.

In the fire it burns to a very beautiful pale red.

I have obſerv'd this in moſt counties of England; about London there are ſeveral ſtrata of it, as near Deptford, Highgate and Hampſtead.

It ſeems worth trying both to make an artificial loam, and in the glaſs trade.

It is not an improper caution to give here, to thoſe who are but newly enter'd on theſe ſtudies, to be very careful in the collecting ſpecimens of ſands, no Foſſils are ſo common or might ſeem ſo eaſily collected, but to do this to any purpoſe requires ſome care and circumſpection. This and many other Sands hereafter to be deſcrib'd, are ever found compos'd of particles of different colours and ſhapes, and as they are conſtant to this in all places, may be very properly eſteem'd peculiar ſpecies; but it is common to find accidental mixtures of this kind, which are of two well known ſpecies jumbled together by nature, by other accidents, or by the collectors careleſſneſs; I need not ſay theſe are not to be regarded as any ſpecies at all; but muſt obſerve to the collector, that it is proper always to pick out his ſpecimen from the ſtratum itſelf, not to take it out of what the diggers have thrown out of the pit, in which all the ſeveral ſtrata of it are mix'd in the digging, and to take it always carefully from the middle of the ſtratum; for if this is done near the edges, a thouſand to one ſome of the ſand of the adjoining bed is mix'd with it: I ſhou'd not have judged this caution neceſſary, but that two or three pretty collections which I have ſeen are all made uſeleſs, by this inaccuracy and want of care in the perſons who collected the ſpecimens.

3. *Arena ſplendida, craſſior & craſſiſſima, variegata.*
Large, coarſe, variegated Sand.

This is a Sand than which no ſpecies is more frequent, and none ſo likely to lead a young obſerver into the common error of forming imaginary new ſpecies; in botany we find two or three plants which are apt to put on at times ſuch different faces, that they deceive the young ſtudents, and of that kind is this Sand among the Foſſils. It appears in all places, in many different ſizes, and with different mixtures, yet one deſcription will be found to fit it in all theſe circumſtances.

It is a very beautiful Sand, tho' the moſt impure of all that I know; it differs extreamly in degrees of fineneſs or coarſeneſs, nor are the particles of the ſame maſs at all uniform; in general it may, however, be obſerv'd of it, that it is often very coarſe and never very fine; it is conſiderably heavy, and in colour a pellucid white, deeply variegated with black, red, brown, a chalky white, and the different ſhades of yellow, all theſe give it a very pretty appearance; and its white, which is in much the greateſt quantity, a very conſiderable brightneſs; its particles are by no means uniform in regard to one another, either in ſhape or ſize: It feels very hard, but leſs rough than many other Sands between the fingers, and ſhook up in water ſettles immediately without leaving any muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of a multitude of white particles, generally approaching to a roundiſh ſhape, very tranſparent, and with ſomething of the Cryſtalline water; among theſe there are other truly arenaceous particles, ſome of a gloſſy white and irregular angular figure, and others roundiſh and yellow, and very beautifully tranſparent; but beſide theſe there are a vaſt number of thoſe particles which give the principal variegation in the colour; theſe are not arenaceous, or any thing approaching to that Claſs of Foſſils, but are really ſmall and opake, yellow, black, red and other colour'd Pebbles; and beſide theſe there are uſually among it many fragments of larger Pebbles and Flints, and a great number of pieces of the white opake cruſts of Flints. Theſe are the things of which this ſpecies of Sand conſiſts, when in its utmoſt purity; but beſide theſe it is frequently found containing many other adventitious particles.

It is found ſometimes compoſing ſtrata of itſelf, at other times mix'd with gravel, and very frequently on the ſhores of the ſea and rivers; when in ſtrata of itſelf it is generally tolerably clean, and of the coarſeneſs of the other large Sands; when among gravel it is dull and dirty, and commonly much larger, and indeed is often in a great meaſure no other than a ſmaller gravel; and when on the ſea ſhores is ever very clean and bright, and mixt with fragments of ſhells, corals, and other marine productions, and in this ſtate has generally been accounted another ſpecies, and call'd ſea Sand.

It makes no efferveſcence with Aqua Fortis, unleſs when from the ſea ſhores, and containing fragments of marine productions.

It burns to a very beautiful variegated pale red.

It is common in the Sand pits in Suſſex and Kent, and among the gravel about London, as alſo on the ſea and river ſhores in moſt places.

b. Containing heterogene particles not arenaceous.

1. *Arena micacea, tenuis, albo-fuſca, hebes.*
Fine, dull, browniſh-white Sand, with Micæ.

This is but a dull and dead looking Sand, of a diſagreeable colour, and but thinly interſpers'd with the Mica. It is moderately fine, not ſo heavy as many other Sands, and of a very pale dead whitiſh brown, with ſcarce any brightneſs, except that of a very few white glittering particles, here and there interſpers'd, and apparently different from the reſt of the maſs; the particles that compoſe the maſs ſeem pretty uniform in ſize; it feels leſs harſh between the fingers than many of the other Sands, and ſhook up in water ſettles but ſlowly, and leaves a browniſh muddineſs in it.

Examin'd by the Microſcope, it appears an aſſemblage of ſmall uniform particles of uncertain figures, but approaching to round, and of ſmooth, and not angular ſurfaces; the great quantity of theſe are of a glaſſy white, and very fair tranſparency, but are interſpers'd with others of a pale brown, and a few plated white particles evidently fragments of a foliaceous Talc.

It makes no efferveſcence with Aqua Fortis.

It burns to a plain black colour, or to a faint duſky red.

It is common in the ſand pits of England, and generally lies near the ſurface, on the ſhores of rivers; it is not unfrequent, but there is ſomething more bright and paler colour'd, which is owing to its being cleaner.

This is in common uſe in many counties of England to mix with mortar, and with lime and hair to cement ſtones, and plaiſter buildings. In the pit it often hangs together, in form of a ſoft ſtone; this is owing to an admixture of a blueiſh clay in ſmall quantity, and this makes it eſteem'd in the plaiſtering of walls; for which purpoſe it ſerves with a leſs admixture of lime than it will admit when more pure and clean, as it is when taken from the ſhores of rivers; from which laſt places they always choſe it for cements that require ſtrength, as it admits more lime in the compoſition.

This uſe of Sand with lime in the cementing of ſtones is very antient. Juſtin mentions as a ſingularity the walls of Babylon having been built without it, ſpeaking of Semiramis, he ſays, *hæc Babyloniam condidit, murumque urbi coЄto latere circumdedit; Harenæ vice, Bitumine interſtrato.* Not that this author is to be here underſtood by the word Harena to mean Sand alone; that wou'd infer that lime was us'd in the building of thoſe walls, and the Bitumen mixed with it in the place of Sand; which certainly was not at all the caſe; for Vitruvius, who mentions the ſame circumſtance, abſolutely declares the abſence of lime as well as Sand in that cement, *non enim uti Babylone abundantes liquido Bitumine eo, pro Calce & Arena, & coЄto latere factum habent murum*; the Bitumen, it is evident therefore, ſupply'd the place of both Sand and lime, and was alone the cement us'd as mortar for the bricks of that building; and the reaſon for Juſtin's uſing the word Arena, is not that he ſuppos'd Sand alone left out here, or that that alone was ever us'd as a cement; but that the Romans, from the conſtant mixture of Sand and lime into mortar on theſe occaſions, had brought it into a cuſtom to uſe the word Arenatum for a mixture of lime and Sand into mortar; and either they alſo us'd the word Arena alone in the ſame ſenſe, or as Salmaſius * very juſtly obſerves, the original reading of the paſſage in Juſtin muſt have been, *Arenati vice, Bitumine interſtrato*, and not Arenæ, as we now ſee it printed: That Sand cou'd not do without lime on theſe occaſions, was known among them even to a proverb; for they very aptly call'd an incoherent diſcourſe, *Arena ſine calce.* Vitruvius in many places calls mortar made of theſe ingredients, Arenatum; and Pliny expreſſly names the Bitumens ſupplying the place of lime, not naming the Sand, *Calcis quoque uſum præbuit in ferruminatis Babylonis muris.* Not that he here means lime alone, any more than Juſtin, if we allow his paſſage in the preſent reading, did Sand alone, for when the antients meant to expreſs lime alone, or without Sand in buildings, they always call'd it Calx nuda, to diſtinguiſh it from the mix'd ſtate they always underſtood it to be in in thin mortar, or the Arenatum as they call'd it; from all which the Antiquity of uſing it in theſe mixtures on the ſame occaſions, is plainly evinc'd.

2. *Arena micacea, tenuior, albo-ſubvirens, hebes.*
Fine, dull, greeniſh-white Sand, with Micæ.

This is a dull, duſky looking Sand, moderately fine, of a deep dirty looking colour, and but thinly interſpers'd with Micæ. It is conſiderably fine, very heavy, of a deep browniſh-white, with ſomething of a greeniſh caſt, and without all brightneſs, except that of a few ſhining Micæ ſcatter'd here and there through it: Its particles are by no means regular or uniform in ſize, it feels hard and harſh between the fingers, and ſhook up in water ſettles but ſlowly, and leaves a whitiſh-brown muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of ſmall irregular particles, of all ſhapes and ſizes, but in general of ſmooth ſurfaces, and approaching to roundneſs; they are very irregular in their colour, as well as bigneſs, the generallity being tranſparent and of a glaſſy white, but many of a leſs degree of tranſparence, and of a ſomewhat greeniſh-brown; among theſe there lie here and there a few ſmall pieces of a very fine and perfectly tranſparent foliaceous Talc.

It makes no effervescence with Aqua Fortis.

It burns to a duſky browniſh red.

It is common in the Sand pits of Deptford, Blackheath and Woolwich, and lies in ſtrata of a vaſt depth; I have obſerv'd it alſo in Suſſex and Kent. A young obſerver might be deceiv'd into the making three ſpecies of this, from its different appearance, according to the greater or leſſer quantity of the browniſh-green particles; it is often of different degrees of colour in the ſame pit, and at times almoſt white; and on the ſhores of ſome rivers I have met with it, and have ſpecimens of it ſo clean waſh'd, as to appear with ſome degree of brightneſs, and very clean; inſomuch that the accurate view of the Microſcope alone, cou'd determine it to be the ſame ſpecies.

Much of the green glaſs of London is made with this Sand.

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* Salmaſ. in Solin. p. 867.

3. *Arena Micacea, tenuior, albo-grizea, ſcintillans.* *Fine, glittering, greyiſh-white Sand, with Micæ.*

This is a very beautiful glittering Sand, but owes its brightneſs almoſt entirely to the adventitious ſpangles of Talc it contains, and of which it is extreamly full; its genuine particles are conſiderably ſmall and fine, it is but moderately heavy, of a very good white, but not without ſome admixture of greyiſhneſs; and has beſide what it owes to the ſpangles which it is full of, but little brightneſs of its own; its particles are very irregular in ſize, but all of them ſmall, and interſpers'd with a great quantity of a fine white glittering foliaceous Talc, in pieces of different ſize, but almoſt all much larger than thoſe of the Sand, and all very thin; theſe give it a very agreeable ſplendour, and make it one of the prettieſt of the white Sands; rub'd between the fingers it feels very hard and harſh, and ſhook up in water ſettles in a little time, and leaves not the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears an aſſemblage of particles of three different kinds; the principal quantity or body of the maſs is of various ſiz'd particles, of a good glaſſy tranſparence, and oblong and ſomewhat angular figure; among theſe lie, in great quantities, the flat pieces or flakes of Talc, which are perfectly white, very bright, and make a very pretty figure; but beſide theſe there are ever a few particles of an opake Spar; they are of a dead white, and diſcoverable not only by their want of tranſparence, but their approach to a Rhomboidal figure; ſome of them retain their angles, but in moſt they are rubb'd off.

According to the quantity of theſe it is poſſeſs'd of, it makes a ſlight effervеſcence with Aqua Fortis.

It burns to a deeper grey without any tendency to redneſs.

It is found on the ſhores of the iſlands of Scilly in great plenty.

SECT. II. The Red and Reddiſh SANDS.

A. Such as are pure.

1. *Arena craſſior, ſplendida, rubeſcens.* *Large, ſhining, red Sand.*

This is a very pure and beautiful Sand, and the only one, that I have yet heard of, of this ſtrong colour, all the other red Sands being pale; it is conſiderably large and coarſe, very heavy, and of a ſtrong glowing red, approaching to a deep orange colour, or that of Saffron in the cake; it is very far from a dull Sand, but is of leſs brightneſs than many of the white kinds; the particles compoſing it ſeem very regular and uniform in ſize, and are of various figures, but apparently approaching to round: it feels extreamly hard and harſh between the fingers, and thrown into water ſettles immediately, without leaving any muddineſs in it.

Examin'd by the Microſcope, it appears an aſſemblage of particles, very uniform in ſhape, ſize, and colour; they are all of duſty ſurfaces, approaching to roundneſs in figure, not angular, and all of them of a deeper or paler yellow, and moderately tranſparent.

It makes no effervеſcence with Aqua Fortis.

It ſuffers not the leaſt change in the fire.

It lies very plentifully on the ſhores of the iſland of Santorini, and is generally taken notice of by ſtrangers on account of its extraordinary colour: I never receiv'd it from any other place, and am apt to believe, for many reaſons, it has been alter'd in colour by ſubterranean fires, tho' I know no ſand which any fire we can give will make of this colour.

2. *Arena craſſior, ſplendida, carnea.*
Large, ſhining, fleſh colour'd Sand.

This is alſo an extreamly ſingular and beautiful Sand; it is conſiderably coarſe, and very heavy; its colour is a bright, and very elegant pale red, or what we commonly call fleſh colour; it is remarkably bright and ſparkling; its particles appear very uniform in ſize, and ſeem irregularly angular, and differently ſtain'd with the colour of the maſs; it feels very harſh and rough between the fingers, and ſhook up in water ſubſides immediately, without leaving the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of particles, very like in ſhape and ſize, but very different in colour and degree of tranſparence; they are in general of irregular and blunted angular figures, of ſmooth, and, for the moſt part, gloſſy ſurfaces, ſome perfectly tranſparent, others quite opake, and many ſemidaphanous, and ſome appear white, others yellow in different degrees, and ſome of a pale red.

It makes no efferveſcence with Aqua Fortis, and burns to a ſomething deeper red.

I receiv'd it from Naples, near which place it is very common; it very much reſembles ſome of the white ſands when burnt, and may poſſibly have been alter'd by ſubterranean fires.

3. *Arena craſſiſſima, ſplendida, è fuſco aliquantulum rubeſcens.*
Coarſe, ſhining, browniſh red Sand.

This is an extreamly large, looſe and coarſe Sand, generally found very pure, and near the ſurface; it conſiſts of large and ſeemingly roundiſh particles, and is very heavy; it is of a pale whitiſh brown, with a very faint bluſh of reddiſhneſs, and remarkably bright, and ſparkling; its particles appear very irregular in ſize, and it feels very harſh and rough between the fingers; ſhook up in water, it ſettles very quickly, and leaves no muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of particles of very different ſizes, moſtly approaching to a roundiſh ſhape, or appearing parts of broken pieces of that figure of ſmooth ſurfaces, and a moderate degree of tranſparence; moſt of them appear to the Microſcope almoſt colourleſs, and ſome few only of a faint browniſh and reddiſh tinge, tho' probably they have all more or leſs of it, only in ſome it is too ſmall in quantity to be viſible.

It makes no efferveſcence with Aqua Fortis.

It burns to a deeper and redder colour.

It is frequent in the heaths of Suſſex, and Buckinghamſhire: it ſometimes is found impure from accidental mixtures of dirt as it lies near the ſurface, and ſometimes on the ſhores of rivers, waſh'd to a fine purity and brightneſs.

4. *Arena tenuior, ſplendida, fuſco-rubens.*
Fine, browniſh red, ſhining Sand.

This is a fine and elegant Sand, and of a very agreeable tho' not lively colour, it is always found perfectly pure, and of the ſame fine compoſition: It is very heavy, and of a deep browniſh red, or more properly ſpeaking, reddiſh brown; for the brown appears the predominant colour, the red diſcovering itſelf only in an univerſal glow thro' the whole maſs: It is very bright and ſparkling, and its particles appear pretty uniform in ſize and ſhape; rubb'd between the fingers it is very hard and harſh, tho' compos'd of ſo ſmall particles; and ſhook up in water ſinks quickly, and leaves a ſlight whitiſh muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of uniform particles, much of the ſame ſhape and ſize, obtuſely angular, and in general flattiſh, they have ſmooth ſurfaces, and a moderate degree of tranſparency, and are differently ting'd with a very pale browniſh red, in many of them too little to be diſtinguiſhable, and in moſt only giving the appearance of a leſs tranſparent piece of Cryſtal.

It makes no efferveſcence with Aqua Fortis.

It burns to a deep grey without the leaſt redneſs.

It is found toward the ſurface in many parts of England; in the neighbourhood of London it is not uncommon, particularly on Hampſtead Heath.

5. *Arena tenuiſſima, ſplendida, è fuſco pallide rubens.*
Fine, pale, browniſh red ſhining Sand.

This is a ſhining but faint diſagreeably colour'd Sand; it is generally found perfectly pure, and in deep ſtrata; it is of a very great fineneſs, and leſs heavy than many of the Sands, and of a pale and unpleaſing reddiſh brown. It is conſiderable bright and ſhining for a Sand of ſo fine texture, and ſeems compos'd of very irregularly ſiz'd particles. It feels conſiderably hard between the fingers, and ſhook up in water, ſubſides but ſlowly, and leaves a reddiſh brown muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of particles of very different ſizes, but generally approaching to a roundiſh ſhape of ſmooth ſurfaces and moderate tranſparence, and ſtriated very ſlightly with a faint browniſh red, moſt of them too ſlightly to let it be diſcoverable by the Microſcope; the maſs in general appearing to that like a colourleſs Sand.

It makes no efferveſcence with Aqua Fortis.

It burns to a pale red.

It is common near the ſurface on the heaths in Suſſex; this was from Hind Head, near that vaſt cavity, vulgarly call'd the Devil's Punch Bowl.

B. Reddiſh Sand, impure, containing heterogene Talcy particles.

6. *Arena micacea, tenuiſſima, pallidiſſime rubeſcens.*
Pale red, very fine Sand, with Micæ.

This is a very beautiful and bright Sand, but very thinly interſpers'd with the Micæ: it is remarkably fine, very heavy, and of a very agreeable colour, made up as it were of a mixture of white, pale brown, and pale red; very bright and glittering, and compos'd of ſmall uniform particles, ſpangled with a ſlight admixture of a foliaceous Talc, in very ſmall pieces. It feels very ſharp and harſh between the fingers, and ſhook up in water ſettles but ſlowly, but leaves no muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of extreamly minute particles, very much of the ſame ſize, and perfectly pellucid; they are roundiſh, or fragments of roundiſh pieces, and ſhew no tinge of colour when thus magnified; here and there ſmall pieces of a very fine foliaceous Talc, are ſeen intermix'd with the other particles, and make a pleaſing variety in the object.

It makes no efferveſcence with Aqua Fortis.

It burns to a pale browniſh white, loſing all its redneſs in the fire, which is ſomething very ſingular, as almoſt all other Sands acquire more or leſs redneſs by that means.

This is a common Sand in the Deſarts of Arabia, and not found that I know of in any other place; if we conſider the extream fineneſs of this and ſome other Sands which I have from theſe places, it will appear leſs wonderful that immenſe bodies of them are rais'd and carry'd up by winds, than if they were as large and coarſe as many of ours.

Sect. III. The Yellow SANDS.

A. Such as are pure and free from heterogene particles.

1. *Arena tenuior, hebes, è fuſco pallidiſſime flaveſcens.* *Fine, pale browniſh-yellow, dull Sand.*

This is a fine but dull looking Sand, and of a very pale diſagreeable colour; it is generally found perfectly pure, and is very fine, and conſiderable heavy; it is of a pale colour, ſeemingly made up of white, pale brown, and pale yellow, very dead and dull, and in ſome degree reſembling a heap of duſt; its particles are very irregular in ſize, a great number of them being moſt extreamly minute, and it is ſoft between the fingers; ſhook up in water, it ſettles very ſlowly, and leaves a whitiſh muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of particles of irregular ſhape and ſize, but in general approaching to a roundiſh figure, of ſmooth ſurfaces, and differently tranſparent, ſome perfectly ſo as Cryſtal, ſome nearly opake. Many of them ſeem to the Microſcope perfectly colourleſs, and the others are ting'd with different degrees of a pale yellow.

It makes no efferveſcence with Aqua Fortis.

It burns to a pale red like that of the ordinary red bricks.

It is common in the Sand pits on Hampſtead Heath, and in moſt parts of the kingdom.

2. *Arena ſplendida, tenuis, è rufo pallide flaveſcens.* *Fine, ſhining, pale reddiſh yellow Sand.*

This is a common and not very beautiful Sand; it generally lies pretty deep and in thick ſtrata; it is moderately fine, conſiderable heavy, and of a pale colour, ſeemingly made up of a reddiſh brown, white and yellow, mix'd in ſuch a manner, that it is not eaſy to ſay which predominates. It is conſiderable bright and ſhining, and ſeems compos'd of tolerably regular particles. It feels harſh and rough between the fingers, and ſhook up in water ſettles but ſlowly, and leaves a yellowiſh muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of particles, many of them roundiſh, and many others obtuſely angular; they are all nearly of a ſize, but differ in degree of tranſparency; the roundiſh have the leſs ſmooth ſurfaces, and leſs tranſparence, as is always the caſe, and the angular in general have the fair water of Cryſtal; they are in general too ſlightly colour'd to appear ſo to the Microſcope, the whole view'd before that appearing a white Sand.

It makes no efferveſcence with Aqua Fortis.

It burns to a pale brick colour.

It is common about Hampſtead, Highgate, &c.

3. *Arena tenuiſſima, ſplendida, pallide flava.* *Very fine, ſhining, pale yellow Sand.*

This is a very elegant and beautiful Sand, generally found at conſiderable depths, and in but thin ſtrata; it is generally very pure, is extreamly fine, and of conſiderable weight; in colour it is of a very pale but pure and perfect yellow, without the leaſt caſt of either whitiſh, browniſh, or reddiſh. It is very clean, and conſiderable bright and ſhining, its particles ſeem uniform in ſize. It feels very hard and harſh between the fingers, and ſhook up in water, ſettles very quick, and leaves not the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of obtuſely angular particles, all nearly of the ſame ſize, of ſmooth ſurfaces, and a fine tranſparency, ſome of them appearing perfectly colourleſs and cryſtalline, and others variouſly ting'd with the ſeveral degrees of yellow.

It makes no efferveſcence with Aqua Fortis.

It burns to a ſtrong red or brick colour.

It is a common Sand in the Deſarts of Arabia, and is found alſo in Kent and Suſſex, and many other parts of England.

4. *Arena tenuior, ſplendida, aurea.*
Fine, ſhining, gold colour'd Sand.

This is a very beautiful Sand, generally found at ſome depth from the ſurface, and conſtituting conſiderably thick ſtrata. It is very pure, conſiderably fine, of great weight, and a fine bright pale yellow, reſembling that of gold. It is very bright and ſhining, and compos'd of ſeemingly uniform particles. It is very hard and harſh between the fingers, and ſhook up in water, ſettles immediately without leaving any muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of ſimilar particles, all ſomewhat angular, and tending to an oblong figure; they are all moderately tranſparent, ſome colourleſs, and others ting'd with different degrees of a pale yellow.

It makes no efferveſcence with Aqua Fortis.

It burns to a dirty browniſh red.

It is common in the Sand pits on Hampſtead Heath, and in moſt other parts of the Kingdom.

5. *Arena craſſiſſima, ſplendida, pallide flava.*
Very coarſe, ſhining, pale yellow Sand.

This is a coarſe ordinary Sand, generally found in Sand pits at a few feet depth, and ſometimes among gravel. It is commonly very pure, is extreamly large and coarſe, conſiderably heavy, of an equal and uniform pale yellow, and is very bright and ſparkling; its conſtituent particles are irregular in ſize. It feels very harſh and hard between the fingers, and ſhook up in water ſettles from it in a moment, and leaves no muddineſs in it.

Examin'd by the Microſcope, it appear a congeries of different ſiz'd, but pretty regularly ſhap'd particles; all either of a roundiſh ſhape, or ſeeming fragments of roundiſh ones, of but a moderate degree of tranſparence, and pretty equally ting'd with a very pale yellow.

It makes no efferveſcence with Aqua Fortis.

It burns to a fair red.

This is a Sand of great uſe in the common affairs of life, the good women ſcour and clean their pewter veſſels with it; and the ſtone cutters uſe it in cutting their harder ſtones, and in poliſhing thoſe frequently us'd in the nicer pavements; for this laſt purpoſe, there is ſcarce any other Sand equal to it.

It is common about Highgate, Hampſtead, and other places to the North of London, and in many other parts of the Kingdom.

6. *Arena craſſiſſima, albido-flava, hebes.*
Coarſe, dull, whitiſh yellow Sand.

This is a very coarſe and diſagreeably colour'd Sand; it is generally found at ſmall depths, and among gravel. It is remarkably and irregularly coarſe, very heavy, of a dull whitiſh yellow colour, and almoſt wholly without brightneſs, unleſs nearly view'd; for it is to be obſerv'd, that every genuine Sand on a cloſe inſpection, muſt ſhew ſome degree of brightneſs; its particles are of very different ſizes, ſome very ſmall, tho' the greater part are remarkably coarſe, and not a few hanging in form of duſt on the ſurfaces of the reſt.

It feels very harſh between the fingers, and ſhook up in water, ſinks irregularly, and leaves a yellowiſh muddineſs in it.

Examin'd by the Microſcope, it appears an aſſemblage of differently ſhap'd and ſiz'd particles; but moderately tranſparent, and differently ting'd with a pale yellow.

It makes no efferveſcence with Aqua Fortis.

It burns to a brick colour, or pale dirty red.

It is common about Hyde-Park, Marybone, and many other places in the neighbourhood of London, and in moſt other parts of the kingdom.

7. *Arena craſſior, ſplendida, lutea.*
Large, ſhining, yellow Sand.

This is a common Sand, found in ſtrata of itſelf in great plenty, nor is leſs common among gravel: It is always perfectly pure, is conſiderably coarſe, very heavy, and of a fair bright yellow, and very ſhining; its particles ſeem tolerably regular in ſize: It feels extreamly coarſe between the fingers, and ſhook up in water, ſettles immediately, and leaves no muddineſs in it.

Examin'd by the Microſcope, it appears a maſs of uniform particles, roundiſh, and in ſhape reſembling ſmall Pebbles, of moderately ſmooth ſurfaces, tranſparent, but with no great brightneſs, and all ting'd with different degrees of yellow.

It makes no efferveſcence with Aqua Fortis.

In the fire it burns to a fine red.

It is common about London, in Hyde-Park, and other places.

This Sand, as alſo ſome others, are apt to vary a little in their degree of colour in different parts of the ſame ſtratum, but as thoſe variations are but in very ſlight degrees, and the general character of the ſpecies ever remains the ſame, they are not likely to lead into errors: The roundneſs of the particles in this Sand, as in all the other pebble ſhap'd ones, is plainly owing to the edges of their original angles being broken off by their rubbing againſt one another.

8. *Arena craſſiſſima, lutea, ſplendidior.*
Coarſe, very bright, yellow Sand.

This is a large hard Sand, never found but at conſiderable depths, and ſeldom in any great quantity. It is always perfectly pure, is remarkably coarſe, large and rough, very heavy, and of a bright fair yellow; its particles ſeem very regular in their ſize: It ſeems the harſheſt and rougheſt of all Sands to the touch; and ſhook up in water ſettles immediately without leaving the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears an aſſemblage of fine large cryſtalline particles, beautifully ting'd with an amber colour; they are very uniform in ſhape and ſize, approaching to the ordinary ſhape of Pebbles, of ſmooth ſurfaces, and a fair water.

It makes no efferveſcence with Aqua Fortis.

It burns to a pale red brick colour.

It is found in Northamptonſhire, and ſome other places, under the ſtrata of gravel. The figures of all the particles of ſand ſeem to have been originally angular, and even in theſe roundiſh ones we may obſerve a tendency to that figure, they having plainly been angular bodies, and only have had their corners rubb'd off by rubbing againſt one another.

9. *Arena craſſior, lutea, hebes.*
Large, dull, yellow Sand.

This is a coarſe and dead looking Sand, of a diſagreeable colour, and is, I believe, the produce of all parts of the world.

It is generally pure, conſiderably coarſe, very heavy, and of a dull diſagreeable yellow, ſomething deeper than that of either of the precedent, and remarkably wants brightneſs; its particles ſeem very irregular in ſize; rub'd between the fingers, it feels conſiderably hard, but leſs harſh or cutting than many of the others, and ſhook up in water, ſettles quickly, but leaves a little yellow muddineſs in it..

Examin'd by the Microſcope, it appears a maſs of very irregularly ſhap'd particles; they are all of a figure, approaching to that of the common Pebbles, many of them of very unequal ſurfaces, ſome flattiſh, and others crooked; they are moderately tranſparent, and of a fine amber colour.

It makes no effervefcence with Aqua Fortis.

It burns to a ſomething deeper red than moſt of the yellow Sands.

It is common in the Sand pits, and on the ſhores of rivers in England; I have alſo receiv'd it among other things from Germany, Italy and Spain; that on the ſhores of rivers is always neceſſarily cleaner than that from the pits, and does not ſucceed in leaving a muddyneſs like that in water; that part of the character of theſe Sands is never to be enquired into, unleſs when they are taken from the ſtrata; as it muſt ever be owing to accidental earthy particles, which may be carry'd away at any time by two or three repeated waſhings, and muſt therefore be wanting in thoſe Sands found in the reach of waters.

This is the ſand moſt eſteem'd and moſt generally us'd by the plumbers in London, for the bed to caſt their ſheet lead on; they have it for this uſe from Hackney river, and find it preferable to all others; a coarſer than this wou'd make the under ſurface of the ſheet too rough and unequal, and a finer wou'd be diſcompos'd and driven in heaps before the running maſs.

This particular Sand is alſo in great uſe among our ſtone cutters, in the ſawing of marble: This was a uſe Sands were alſo employ'd about, as early as the days of Theophraſtus, and that dark paſſage in his hiſtory of ſtones, ὁι δὲ σιδήροις μετὰ ἀμβλησι δὲ καί ἐισιν ὥςε παραπλησίως δὲ κατὰ το μη τέμνεσθαι σιδήρῳ, means no other, but a reference to that well known method of cutting marble, &c. by blunt iron ſaws, with the help of Sand and water, in which caſe they were not truly cut by the iron, but by the Sand. The antients, however, in this much excell'd us, we know of no other than common Sand for theſe uſes; whereas they, beſide the ordinary and coarſe Sands, frequently made uſe of other finer and ſofter Sands, and of the gritt of the Porus or Pumice, either naturally found looſe, or reduc'd to powder by art; with theſe which were ſo much finer, they cut the larger ſtones with leſs roughneſs of ſurface, and leſs loſs of ſubſtance; and I cannot but think, the gritts of ſome of our ſtones found looſe on the hills of Yorkſhire, to be deſcrib'd hereafter, wou'd be well worth the tryals of the perſons employ'd in theſe things. I mention theſe particular gritts which are naturally looſe, becauſe in ſtones which we reduce to powder, the particles are of ſo uncertain and unequal ſize, and ſo foul with the ſparry and other ſofter matter of the ſtone, that no uſe could be made of them; whereas in theſe naturally looſe gritts, whether they have been once conſolidated or originally looſe, which is a queſtion not eaſily at preſent determin'd, the particles are ever found all hard, all pure, and all in a great meaſure uniform. Pliny names this method of the antients, and at the ſame time leaves us no room to doubt their knowing alſo the uſe of our coarſer matter on occaſions where it was proper; the only difference between us ſeems to have been that they us'd it only on ſuch occaſions, and we on all. His words are, *Craſſior enim harena laxioribus ſegmentis terit, & plus erodit marmoris majuſque opus ſcabritie politurœ relinquit, rurſus Thebaica polituris accommodatur & quœ fit è Poro lapide & è Pumice.*

10. *Arena, fulva, tenuis hebes.*
Fine, dull, deep yellow Sand.

This is a very dull, duſty looking, and unpleaſant colour'd Sand; it is in general tolerably fine, but of ſo uncertain a ſize in its particles, if nicely examin'd, that it is not eaſy to determine what degree of fineneſs belongs to it; it is lighter than moſt of the other Sands, of a ſtrong, and ſomewhat deep yellow, but quite deſtitute of brightneſs. Its conſtituent particles are of thoſe of all the Sands the moſt irregular, ſome of them extreámly minute, and others in different degrees up to the ſtandard I have plac'd it in, that is the ſize of thoſe of the common writing Sand. It feels very ſoft between the fingers, and ſhook up in water, ſettles very ſlowly and irregularly, and leaves a great deal of a yellow ochreous matter ſuſpended in it, which afterwards ſettles and forms a different ſediment upon it.

Examin'd by the Microſcope, it appears an aſſemblage of different ſiz'd particles, all approaching to the ſhape of ordinary Pebbles, of very irregular ſurfaces, moderately tranſparent, and of a very fair amber colour; there are among the reſt, an immenſe number of particles ſo ſmall, as to appear like duſt ſticking to the ſurfaces of the reſt, and beſide theſe, a number of earthy particles of a deeper yellow.

It makes no effervefcence with Aqua Fortis.

It burns to a dead red.

I receiv'd it from America, but have frequently met with it alſo in England; it is common in Wiltſhire, and on the ſhores of rivers makes a very different appearance, being there much clearer, and of a paler yellow, but never has any great brightneſs.

11. *Arena craſſiſſima, crocea, hebes.*
Large dull, ſaffron colour'd Sand.

This is a coarſe, but very beautiful Sand, found uſually in the lower ſtrata in Sand pits. It is perfectly pure, very large, hard and coarſe, conſiderably heavy, and of a very beautiful ſtrong and bright yellow, but without that ſhining brightneſs common in moſt of the Sands; its particles ſeem irregular in ſize: It feels very hard and rough between the fingers, and ſhook up in water ſettles immediately, without leaving the leaſt muddyneſs in it.

Examin'd by the Microſcope, it appears a congeries of particles of very different ſhapes and ſizes; they reſemble in general the ſhape of the ordinary Pebbles, they have many of them very unequal ſurfaces, are moderately tranſparent, but without much brightneſs, and are all ſtain'd with a faint yellow.

It makes no effervefcence with Aqua Fortis.

It burns to a duſty browniſh red.

It was ſent to me from France as a great curioſity, being the very Sand from the gold coaſt in Africa, out of which a certain very great man of the academy of ſciences us'd to extract gold. I cannot ſay that we have the very ſpecies in England; but one of ours to be deſcrib'd hereafter approaches ſo nearly to it, that if the gold that gentleman produc'd was ever embodied in the Sand, ours in all appearance ſeems to promiſe the ſame metal. I am, however, rather of opinion, that the gold obtain'd from that, was from a number of ſmall pieces of that metal ſo minute, as to eſcape the eye, but mix'd among the particles of Sand, as the larger are which the people on the ſpot pick out.

12. *Arena craſſior, ſplendida, ſordide fulva.*
Duſky, yellow, ſhining, coarſe Sand.

This is a common Sand, generally found in thin ſtrata, and at ſmall depths; it is very pure, conſiderably large and coarſe, very heavy, and of a deep duſky yellow, and very bright and ſhining. Its particles ſeem pretty uniform and regular; it feels very harſh and rough between the fingers, and ſhook up in water, ſettles very quickly, leaving no muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of particles tolerably regular, and alike in ſize, in form reſembling Pebbles, of a very good tranſparency and brightneſs, and all ting'd with different degrees of yellow.

It makes no effervefcence with Aqua Fortis.

It burns to a fair deepiſh red.

It is common in the Sand pits of Hampſtead Heath, and many other parts of the kingdom.

There is no room to doubt, but that the Sands owe their colours to the ſame principles in nature with other colour'd Foſſils; one might naturally ſuppoſe indeed, that what colour'd the Sands in general, was the ſame with what alſo colours the tranſparent Gems; but this is true in a few inſtances only, not in the whole ſeries of them; the colours of the Gems in general, are from fine metalline particles, and are driven off by fire; and the ſapphire emerald, or other ſtone expos'd to it, is taken out colourleſs as Cryſtal; this is the caſe in ſome few of the Sands, but is far from being ſo in all; the yellow Sands in particular are all evidently colour'd by the ſame matter that ſtains the yellow Clays and Ochres, ſince theſe like thoſe earths, all burn to a red. The colour in moſt of the Sands is perfectly and thoroughly mix'd throughout their whole maſs; but in ſome few it is only ſuperficial, and makes a cruſt, either wholly or in part ſurrounding them.

13. *Arena craſſiſſima, ſplendida, luteo, fuſca.*
Coarſe, ſhining, browniſh, yellow Sand.

This is a very coarſe and diſagreeably colour'd Sand; it is generally pure, is very large and harſh, conſiderably heavy, and of a deep and duſky browniſh yellow, but very bright and ſparkling. Its particles ſeem very regular in ſize and ſhape; it feels extreamly ſharp and harſh between the fingers, and ſhook in water ſettles very quickly, and leaves a muddineſs of a browniſh yellow in it.

Examin'd by the Microſcope, it appears a congeries of large uniform particles, approaching to Pebbles in ſhape, of very uneven ſurfaces, but of a conſiderable brightneſs and tranſparency, and all ting'd with a faint browniſh yellow.

It makes no effervеſcence with Aqua Fortis.

It burns to a very fair red.

It is common among gravel about London, and in many other parts of England, and ſometimes conſtitutes entire ſtrata of itſelf.

Theſe are the diſtinct ſpecies of the pure yellow Sands of our own and other nations, as far as a moſt ſtrict examination will warrant their being determin'd ſuch. Nothing can be more difficult than to aſcertain the varieties, and really diſtinct ſpecies in things ſo numerous, and ſo nearly approaching to one another: I have had before me on this occaſion, no leſs than two hundred and eighteen ſpecimens of yellow Sand, from different parts of this and other kingdoms; and find by them that multitudes of Sands of different places, are abſolutely of the ſame ſpecies; many others vary but in the degree of the tinge, which alone I have never judg'd a ſufficient character to diſtinguiſh a ſpecies by; and that theſe thirteen are all that can be with any propriety given as diſtinct ſpecies, and to one or other of theſe all the reſt are referable as accidental varieties. The colour in theſe bodies is their moſt obvious quality, but their degree of tranſparency, and the ſhape of their particles, is much more to be depended on; theſe are inherent in the very ſtructure of the body, the other accidental. Theſe, tho' deſcrib'd as pure, and generally found ſo, are ſubject to be mix'd ſometimes with adventitious particles, but are not from ſuch accidents to be look'd on as diſtinct ſpecies; thoſe properly call'd the impure kinds, are ſuch as are never found without adventitious particles, and are in themſelves abſolutely different Sands from any of the others. The following are the ſpecies of theſe, which a like ſcrutiny has encourag'd me to preſent the reader with, and to one or other of which, I am ready to believe, all the impure yellow Sands yet known may be refer'd.

B. Yellow Sands that are impure, containing heterogene particles,
a. containing arenaceous particles of other colours.

1. *Arena tenuior, ſtramineo-vireſcens, hebes.*
Fine, greeniſh-yellow, pale, dull Sand.

This is a very elegant and beautiful Sand; it is of very great fineneſs, but moderately heavy, and of a pale whitiſh yellow, ſomething fainter than what we uſually call a ſtraw colour, variegated with particles of green, which are in general larger than thoſe of the reſt of the maſs, and commonly ſeparate themſelves from it. It is perfectly dull, and reſembles a heap of particolour'd duſt. Its conſtituent particles are very irregular in ſize; it feels remarkably ſoft between the fingers, and thrown into water, ſettles but ſlowly in it, and leaves a white muddineſs.

View'd by the Microſcope, it appears an aſſemblage of particles, of very various ſhapes, ſizes and colours, the greater number are of uneven ſurfaces, ſomewhat flattiſh in ſhape, and of a very beautiful ſulphur colour; others there are perfectly colourleſs; both theſe kinds are ſmall, and very tranſparent: But among theſe, there are a much larger kind, ſhap'd like the common Pebbles, but very dimly tranſparent, and of a deep duſky green.

It makes no effervеſcence with Aqua Fortis.

It burns to a pale mottled red.

It is found near the ſurface, in the Sand pits of Hampſtead Heath, and many other places. This, like many other Sands, is ſometimes ſpangled with a few accidental ſparks of a Mica.

2. *Arena tenuior, carneo-vireſcens, hebes.*
Fine greeniſh-red, pale, dull Sand.

This is alſo a very elegant Sand, and in many things approaches to the nature of the former. It is moderately fine, conſiderably lighter than moſt Sands, and of a pale yellowiſh fleſh colour, variegated with ſpecks of green. It has little or no brightneſs, and is compos'd of particles not at all regular in ſize or ſhape, the green ones being much larger than the reſt. It feels conſiderably hard and rough between the fingers, and ſhook up in water, ſettles but ſlowly, leaving a yellowiſh brown muddineſs in it.

View'd thro' the Microſcope, it appears compos'd of irregular particles, ſome flattiſh, and others approaching to the form of common Pebbles; they appear moſt of them either yellow or colourleſs; the green ones being few in number, leſs pellucid than the reſt, tho' none of them are greatly ſo, and of a paler green than thoſe of the former ſpecies.

It makes no efferveſcence with Aqua Fortis.

It burns to a very beautiful pale red.

I have obſerv'd it in Suſſex in great plenty, and once found it in a ſand pit on Hampſtead Heath, but the ſtratum of it is at preſent loſt there.

3. *Arena craſſiſſima, ſplendida, fulvo-nigreſcens.*
Coarſe, blackiſh, yellow-ſhining Sand.

Ths is a common, but a very beautiful Sand, generally conſtituting thick ſtrata, and lying at ſmall depths. It is very large and coarſe, conſiderably heavy, of a ſtrong yellow, variegated with black, and very remarkably bright and ſhining for a yellow Sand, for theſe are ſeldom ſo bright as the white; its particles are all very much of a ſize, but the black ones which make the variegation, and which are not very numerous, are commonly a little ſmaller than the reſt; it feels moſt remarkably rough and harſh between the fingers, and ſhook in water, ſettles immediately, without leaving the leaſt foulneſs in it.

Examin'd by the Microſcope, it appears much of the ſame ſize and figure, all the particles approaching to the ſhape of the common Pebbles, and being differently ting'd with yellow, ſome ſo faintly, as to appear wholly colourleſs; the black particles are of the ſame ſhape with the reſt, but ſeem almoſt perfectly opake, whereas the others are very bright and tranſparent.

It makes no efferveſcence with Aqua Fortis.

It burns to a fine florid red.

It is common in the Sand pits about Tyburn, and elſewhere.

4. *Arena ſplendida tenuis ſtraminio nigreſcens.*
Fine blackiſh-yellow, ſhining Sand.

This is a very clean, fine, and elegant ſand, found in ſtrata of great thickneſs, and at all depths; it is conſiderably ſmall, not very heavy, and of a pale duſky ſtraw colour, variegated with black, and is remarkably bright and ſhining for a ſand of ſo fine texture; its particles are very irregular in ſize, ſome extreamly ſmaller than others, and the black ones, which make the variegation, rather larger than the generality of the reſt; it feels very hard, but not ſo rough and harſh as ſome others, between the fingers, and ſhook in water, ſettles very quickly, but leaves a little browniſh muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of particles of different ſizes, but moſtly of an oblong and obtuſely angular figure, all very tranſparent and bright, and ſtain'd with different degrees of a fine pale yellow; the black particles, which are not very numerous, appear to the Microſcope in ſome degree pellucid, and are of ſmooth ſurfaces, and a roundiſh figure.

It makes no efferveſcence with Aqua Fortis.

It burns to a very pale fleſh colour.

It is common in the ſand pits, and by the ſides of the hollow roads in Suſſex, and is found in many other places, but not any where about London that I have yet obſerv'd.

5. *Arena ſplendida, craſſior, ſulphureo-nigreſcens.*
Large, ſhining, blackiſh, and pale-yellow Sand.

This is a very common, but a very beautiful ſand, found in vaſt ſtrata thro' all parts of this kingdom, and common in many others.

It is conſiderably coarſe, hard and heavy, of a fine brimſtone colour, pretty ſtrongly variegated with black, and extreamly bright and ſhining; its particles are very irregular in ſize; it feels extreamly hard, harſh, and rough between the fingers, and ſhook up in water ſinks immediately, and leaves not the leaſt foulneſs in it.

Examin'd by the Microſcope, it appears an aſſemblage of very beautiful large particles, of a fine clear tranſparence, and good water, approaching to the ordinary Pebbles in figure, and of a very beautiful pale yellow; the black particles, which are very numerous in this ſpecies, are of perfectly ſmooth ſurfaces, and on a ſtrict examination appear to be pieces of plain dark colour'd Flints.

It makes no effervеſcence with Aqua Fortis, nor acquires any redneſs in the fire.

It burns to a pale whitiſh grey.

It is common in the Sand pits on Hampſtead Heath.

In this ſpecies the fragments of Flint, which make the black variegation, have their angles and ſharp edges rubb'd off, by their having been roll'd about againſt one another, exactly as the Pebble-faſhion'd particles of many other Sands, which have all been once angular bodies, and may be ſeen, even in their rounded and Pebble-like form, to have a tendency to ſuch figures, and to have been originally ſuch.

6. *Arena ſplendida, tenuis, flavo ferruginea.*
Fine, ſhining, deep yellowiſh-brown Sand.

This is a very common Sand in many parts of England; it is moderately fine, very heavy, and of a deep duſky yellowiſh brown, mottled with white and colourleſs particles; it is very bright and ſhining, but owes that entirely to the laſt mention'd particles, the brown and the yellow ones being perfectly dull; it is very unequal and irregular in the ſize and ſhape of its particles, remarkably harſh and cutting when rubb'd between the fingers, and ſhook up in water ſinks very quickly, but leaves an ochreous foulneſs in it.

Examin'd by the Microſcope, it appears compos'd of particles of very different ſizes, ſhapes, and figures, but all irregularly angular; ſome are whitiſh, and ſomewhat opake, others perfectly colourleſs, bright, and tranſparent as cryſtal; others ſlightly ting'd thro' with pale brown, or pale yellow, but the greateſt quantity are of the colour of ruſty iron, and perfectly opake.

It makes no effervеſcence with Aqua Fortis.

It burns to a fine deep purple.

This ſpecimen was from the foreſt of Dean in Glouceſterſhire, but I have alſo obſerv'd it in great plenty in Suſſex, Buckinghamſhire, Northamptonſhire, and other places; it generally lies deep under other Sands.

B b. Yellow Sands, which are impure, and contain particles not arenaceous.

1. *Arena micacea, tenuior, fuſco flaveſcens.*
Browniſh-yellow fine Sand, with Micæ.

This is a very elegant, and not unpleaſant colour'd Sand; it lies generally near the ſurface, and in but thin ſtrata; it is conſiderably fine and light, of a pale browniſh yellow colour, and has but little brightneſs; its particles are very uniform, and regular in ſize, and the ſpangles of Talc ſmall, and but few in number; it feels conſiderably ſharp and harſh, tho' fine, between the fingers, and ſhook up in water, ſettles but ſlowly, but leaves no muddineſs in it.

View'd before the Microſcope, it appears a congeries of very ſmall particles, all either of a roundiſh figure, or fragments of ſuch, of unequal ſurfaces, much of the ſame ſize, and very bright and tranſparent: The Micæ are extreamly thin flakes, of a fine and pure foliaceous Talc, very bright, and looking like ſo many ſilver ſpangles among the yellow glittering appearance of the reſt.

It makes no effervefcence with Aqua Fortis.

It burns to a pale grey, with a very faint bluſh of fleſh colour.

It is common in the Sand pits on Hampſtead Heath.

2. *Arena micacea, tenuiſſima, carneo flaveſcens.*
Fine, pale reddiſh-yellow Sand.

This a very elegant and beautiful ſand; it is extreamly fine, yet very heavy, which is contrary to what is generally to be obſerv'd in Sands; of a very elegant pale colour, ſeemingly made up of a pale yellow, and very pale red, and ſpangled with a great number of extreamly ſmall glittering particles. The arenaceous particles have alſo ſome brightneſs; they are pretty uniform and regular in ſize, feel conſiderably harſh between the fingers, and if ſhook up in water, ſettle but ſlowly, and leave a yellowiſh muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of particles very ſimilar in ſize and ſhape, but extremely different in colour and degree of tranſparency; ſome are reddiſh, others yellowiſh, and ſome pellucid, and ſeemingly wholly colourleſs; they are all of the ſhape of ordinary Pebbles, and the yellow ones are much brighter and more pellucid than the red, but the colourleſs moſt ſo of all; the ſpangles are extreamly minute and are thin flakes of a foliaceous Talc.

It makes no effervefcence with Aqua Fortis.

It burns to a duſky pale red.

It is extreamly common and plentiful in America, and is ſometimes ſeen in England: I remember it in Suſſex, and once ſaw it on Hampſtead Heath, where it is not to be found, that I know of, at preſent, but very probably may appear again on the opening ſome new pit.

3. *Arena micacea, ſtraminea craſſior.*
Coarſe, ſtraw-colour'd Sand, with Micæ.

This is a very beautiful and agreeably colour'd Sand; it is conſiderably coarſe, very heavy, of a moſt agreeable pale yellow, conſiderably bright, and ſpangled with fine and pretty large white flakes, in conſiderable number; it has a remarkably clean and pure look, its particles are very regular in ſize; it feels moſt remarkably ſharp and cutting between the fingers, and ſhook up in water immediately ſettles, and leaves no foulneſs in it.

Examin'd by the Microſcope, it appears a very beautiful aſſemblage of particles, all nearly of the ſame ſize, approaching to roundneſs in figure; very bright and tranſparent, and all ting'd with a fine pale yellow, the ſpangles are pretty large and thick flakes of a foliaceous Talc.

It makes no effervefcence with Aqua Fortis.

It burns to a pale red.

It is common in the Sand pits about London, and many other places; I have obſerv'd it in Suſſex and ſome other counties, and have receiv'd it alſo from Italy.

4. *Arena micacea, ſulphurea craſſior.*
Coarſe, ſulphur-colour'd Sand, with Micæ.

This is a very bright, clean and elegantly colour'd Sand. It is conſiderably large and coarſe, very heavy, of a moſt elegant pale colour, ſomething between that of ſulphur and ſaffron, very bright and ſparkling, and adorn'd beſide with a conſiderable number of flat glittering ſpangles; its particles are not very uniform or regular in ſize, and the glittering flakes ſomewhat broader than any of the reſt of the particles; it feels very harſh, rough and cutting between the fingers, and if ſhook up in water ſettles immediately, and leaves no muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of particles of irregular ſizes and figures, many of them ſomewhat opake, and of an exact brimſtone colour; but the greater number very bright, perfectly tranſparent and dy'd with different ſhades of yellow, all of ſomewhat unequal ſurfaces, and in ſhape approaching to the common Pebbles; the ſpangles appear to be like thoſe of the reſt, fine thin flakes of plated Talc.

It makes no effervefcence with Aqua Fortis.

It burns to a very pale greyiſh red.

It is common in Italy, and many other parts of the world; we are not without it in England, but it is not common here; I have obſerv'd it in ſome parts of Suſſex, and once ſaw it on Hampſtead-heath.

5. *Arena micacea, craſſiſſima & ſplendidiſſima, flava.*
Large, ſhining, yellow Sand, with Micæ.

This, tho' a very coarſe, is a very elegant and beautiful Sand. It generally lies deep and conſtitutes thick ſtrata; it is very remarkably large, hard and coarſe, very heavy, and of a fine yellow, a little deeper than the ordinary pale gold colour, extreamly bright and ſhining, and interſpers'd with a great number of white glittering ſpangles. The particles of which it is compos'd are very uniform and regular in ſize; it feels very hard and rough between the fingers, and ſhook in water ſettles in an inſtant, but leaves a little yellowiſh muddineſs in it.

Examin'd by the Microſcope, it makes a very elegant and pleaſing object, its particles are large, all of a ſize very nearly, in ſhape reſembling ſmall Pebbles, and all of a very good tranſparency and beautiful yellow; the ſpangles which are very numerous appear more white and leſs pellucid than thoſe of many other of theſe Sands; they are not ſo thin as theſe uſually are, nor ſeem diſpos'd to ſplit ſo readily, and have in many places tranſverſe lines near their edges; they appear upon the whole not to be flakes of a foliaceous Talc, but fragments of Selenitæ.

It makes no effervefcence with Aqua Fortis.

In the fire it acquires a pale duſky red.

It is common toward the bottom of the Sand pits at Hampſtead, and in many other parts of the kingdom; I have ſeen it in Northamptonſhire, Leiceſterſhire and Suſſex.

6. *Arena micacea, ſordide-fulva, tenuior, hebes.*
Fine, dull, deep yellow Sand, with Micæ.

This is a very duſky yellow ſand, generally found near the ſurface, or at moderate depths, and in conſiderably thick ſtrata. It is conſiderably fine, not very heavy, and of a deep duſky and ſomewhat browniſh yellow; it is very dull except for the glittering of the Micæ, and reſembles a heap of duſt; its particles are very irregular in ſize, and the ſpangles that glitter among it are not very numerous nor large; it feels ſoft between the fingers, and ſhook up in water ſubſides but ſlowly, and leaves a yellow foulneſs in the water.

Examin'd by the Microſcope, it appears a congeries of particles of various ſizes, but all of ſomewhat unequal ſurfaces, reſembling ſmall Pebbles; and of a fine yellow, a multitude of ſmall arenaceous particles, and beſide theſe a quantity of an ochreous clay hang about the larger; and the Micæ are very thin and ſmall ſpangles of a foliaceous Talc.

It makes no effervefcence with Aqua Fortis.

It burns to a duſky browniſh red.

It is common in the Sand pits about London, and in many other places; this is one of the Sands alſo which when found on the ſhores of rivers, aſſumes a very different figure, appearing brighter, cleaner and of a paler yellow.

It is no uncommon thing to find this, and many other of the impurer Sands, ſuch I mean as contain earthy matter among the arenaceous, and leave a foulneſs in water, coaleſced into a kind of ſtone in the pit; this ſpecies in particular very frequently is ſo; and in Suſſex I have often obſerv'd theſe compact ſtrata crack with large perpendicular fiſſures like thoſe of the ſtrata of ſtone; ſome of theſe fiſſures have been abſolutely empty, others half full of looſe Sand, of the colour of the ſtratum; and ſeveral I have obſerv'd filled up with a different colour'd Sand, from the ſtrata above; this gives evidence that theſe cracks were form'd after the upper ſtrata were depoſited and not before, a truth of ſome conſequence, but to be conſider'd more properly hereafter.

7. *Arena micacea, craſſior, aureo-crocea.*
Large, deep-yellow Sand, with Micæ.

This is a rough Sand, generally found at conſiderable depths, and not plentiful or very common. It is very large, hard and coarſe; conſiderably heavy, of a fine ſtrong yellow, between a gold and a ſaffron colour, and moderately bright and ſhining; its particles very irregular and unequal in ſize, and the white ſpangles that are interſpers'd among it are not very numerous, but large and bright; rub'd between the fingers it feels very harſh and rough, and ſhook up in water ſettles immediately, and leaves a ſlight yellowiſh foulneſs in it.

Examin'd by the Microſcope, it appears compos'd of particles tolerably regular in ſize, of unequal ſurfaces approaching to the ſhape of Pebbles, very tranſparent and ſtain'd with a fine yellow; the ſpangles are flat pieces of a white and moderately tranſparent Selenites.

It makes no effervеſcence with Aqua Fortis.

It burns to a fine ſtrong and elegant red.

I have obſerv'd it in two or three parts of Northamptonſhire; as alſo in Kent and Suſſex; it generally lies under all the other ſtrata of Sand.

8. *Arena micacea, craſſiſſima, crocea.*
Coarſe, ſaffron colour'd Sand, with Micæ.

This is a very ſingular and beautiful, and a very uncommon Sand. It is very large and coarſe, moderately heavy and of a fine ſtrong ſaffron colour, or deep reddiſh yellow; it is remarkably dull and deſtitute of brightneſs in itſelf, but is extreamly full of fine gay glittering ſpangles of Talc; its particles are very irregular in ſize, as alſo are the ſhining ſpangles, ſome of which are broader than the largeſt of the arenaceous particles, and many ſmaller even than the leaſt; rub'd between the fingers it feels conſiderably harſh and rough, and ſhook up in water ſettles very ſlowly and irregularly, and leaves a yellow foulneſs in it.

Examin'd by the Microſcope, it appears a congeries of particles, very different in ſize, but all much of the ſame ſhape, of unequal ſurfaces and like ſmall Pebbles; they are moderately tranſparent, of a very fair, fine yellow, and duſted on their ſurfaces, partly by ſmaller particles of Sand, partly by an ochreous Clay. The ſpangles are thin flakes of a fine pellucid foliaceous Talc.

It makes no effervеſcence with Aqua Fortis.

It burns to a deep browniſh red.

I receiv'd it from Germany, where it is very common; and have met with it alſo in Suſſex and in Leiceſterſhire.

9. *Arena micacea, tenuiſſima, fuſco crocea.*
Deep browniſh yellow, fine Sand, with Micæ.

This is a very common and dull diſagreeably colour'd Sand; it lies generally at moderate depths and in thin ſtrata. It is very fine and ſmall, not heavy, and of a deep duſky browniſh yellow, with a little brightneſs in itſelf, but much more from a multitude of ſpangles of Talc, more minute in general than thoſe of almoſt any other Sand; its particles are pretty regular in ſize, and the ſpangles very little exceed them in breadth; rub'd between the fingers it feels conſiderably harſh and rough, and ſhook up in water ſettles but very ſlowly, and leaves a browniſh muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of ſmall particles, very much of a ſize, and reſembling ſmall Pebbles; they have very little brightneſs, and are but dimly tranſparent, but all pretty equally ſtain'd with a fair yellow, the ſpangles appear to be very ſmall and thin flakes of a foliaceous Talc.

It makes no effervеſcence with Aqua Fortis.

It burns to a duſky browniſh red.

It is common in the Sand pits about Highgate and Hampſtead, and in moſt other parts of the kingdom.

Sect. IV. The Brown SANDS.

A. Such as are pure and free from heterogene particles.

1. *Arena fuſca, tenuiſſima, hebes.*
Fine, brown Sand.

This is a fine but diſagreeably colour'd Sand, generally found at conſiderable depths and in but thin ſtrata. It is remarkably fine and ſmall, not very heavy; of a dull, uniform, pale brown, with ſcarce any brightneſs; and not eaſily diſtinguiſhable at a diſtance from an heap of duſt; its particles are pretty uniform and regular in ſize; it feels conſiderably harſh and ſharp between the fingers, and ſhook up in water ſettles but ſlowly, and leaves a muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of particles much of the ſame ſize and ſhape, reſembling ſmall Pebbles, of unequal ſurfaces, moderately tranſparent, but not very bright and all ſtain'd with a very faint brown.

It makes no efferveſcence with Aqua Fortis.

It burns to a pale reddiſh brown.

It is frequent in the Sand pits about Woolwich and Blackheath, under the ſtrata of the more common Sands.

This is one of thoſe ſpecies of Sand of ſo little ſplendor, or cryſtalline brightneſs, as to give ſome ſuſpicion of its not being a genuine body of this Claſs; but this is evinc'd beyond contradiction or doubt, by its refuſing to ferment with acids, a ready and an unerring teſt for theſe bodies, and one that before the ſpecies of this Claſs were arrang'd into the order I have here plac'd them in; I made each of them ſeverally undergo in company with the ingenious and learned Dr. Parſons, one of the few of the preſent age who are for eſtabliſhing natural hiſtory on its true principles, and judging of the ſubjects of it, not from the uncertain accounts of others, but from nature itſelf; and whoſe diſquiſitions on the Rhinoceros, and ſome other ſubjects of the animal world, will do him honour, when the labours of many who now triumph in the republick of letters ſhall have been long forgotten.

2. *Arena craſſiſſima, ſplendida, pallide fuſca.*
Coarſe, ſhining, pale brown Sand.

This is a bright and elegant Sand, generally lying deep and in thick ſtrata; it is one of the largeſt and coarſeſt Sands I know, not remarkably heavy, of a very pale brown, and conſiderably bright and ſparkling; its particles are very uniform and regular in ſize: It feels very coarſe and hard, but not ſo ſharp as many others between the fingers, and ſhook up in water, ſettles immediately, without leaving the leaſt foulneſs.

Examin'd by the Microſcope, it appears an aſſemblage of particles much of the ſame ſhape and ſize, they are all ſomewhat roundiſh, moderately bright and tranſparent, and ting'd in different degrees with a very pretty pale brown.

It makes no efferveſcence with Aqua Fortis.

It burns to a pale browniſh red.

It is common in the Sand pits about Woolwich, and often found on the ſhores of the Thames, and other rivers.

3. *Arena craſſiſſima, ſplendida, fuſco purpurea.*
Coarſe, purpliſh brown, ſhining Sand.

This, when ſtrictly examin'd, is one of the moſt ſingular and remarkable bodies of this Claſs. It is very large and coarſe, of great weight, and of a deep duſky purpliſh brown or chocolate colour, interſpers'd with white; it has a great deal of brightneſs, but that is wholly owing to the white particles, for the brown are all dull and dead, its conſtituent particles are all much of the ſame ſize and figure; it feels very rough and ſharp between the fingers, and ſhook up in water ſubſides very quickly, leaving a ſlight yellowiſh muddineſs in it.

Examin'd by the Microſcope, it makes a moſt ſingular and pleaſing appearance; its particles are much of the ſame ſize, and all of one ſhape, approaching to roundneſs, and reſembling ordinary Pebbles; they are of two very different colours, white and brown or chocolate colour; the former always of ſmooth, the latter of very rough and irregular ſurfaces; a cloſe examination, however, ſhews theſe brown particles to be no other than ſome of the white ones, coated over with a thin cruſt of iron ore; in ſome this coat ſo perfectly ſurrounds them, as to leave this undiſcover'd, but in others it only partially covers, and in ſome is only ſeen laid on in ſpecks, or only on one ſide; the white particles are very pellucid and bright, and it is remarkable, that the ferrugineous matter no where enters the ſubſtance of any of them, but only covers or adheres to their ſurface, as we ſometimes ſee it in thin purpliſh films or ſkins, on ſmall Pebbles in gravel pits; theſe are alſo ſeldom wholly covered by the ferrugineous matter, which is the very ſame in both theſe caſes, and gives us proof from its affecting only the ſurfaces of the bodies, that it has been ſuſpended in water, and depoſited on them ſince their original formation; there is indeed no room to doubt, but that it is ſo to this day; a truth of ſome conſequence, as will appear hereafter, in the treating of the coaleſcence of ſtone.

It makes no efferveſcence with Aqua Fortis.

It burns to a much darker and redder purple.

I found it in a ſtratum of two feet thick, near the Hot Well at Briſtol, it lay at about nine feet depth; I remember to have met with the ſame alſo near Northampton.

B. Brown Sands, containing heterogene particles.

1. *Arena, fuſca, craſſa, hebes.*
Dull, brown, coarſe Sand.

This is a ſingular and uncommon Sand, and ſeldom found in ſtrata in the Sand pits like the others. It is ſomewhat coarſe and hard, conſiderably heavy, of a very pretty pale brown, but dull, and deſtitute of that brightneſs ſo common in the Sands, unleſs view'd very nearly; its particles are very irregular in ſize and colour, ſome appearing to the naked eye much browner and coarſer than the reſt; if rubb'd between the fingers, it feels very harſh and cutting; and ſhook in water, ſettles immediately and leaves no foulneſs in it.

Examin'd by the Microſcope, it appears compos'd of particles of very various ſhapes and ſizes; the greater part are of the ſhape of Pebbles, of a moderate brightneſs and tranſparency, and ting'd with different degrees of brown; but among theſe there are flattiſh pieces in conſiderable number, ſome of which appear to be fragments of Flints, and are of irregular and uncertain ſhapes, and others approach to a Rhomboidal figure with obtuſe angles, and are plainly fragments of Spar.

It makes a conſiderable efferveſcence with Aqua Fortis, which is wholly owing to theſe laſt mention'd particles; for having very carefully pick'd them out from a ſmall parcel, they fermented very ſtrongly with that acid, and the remaining maſs much more weakly than before; and I doubt not, could they have been cleanly ſeparated, it would not have made any efferveſcence with it at all.

It burns to a pale reddiſh brown.

I have once or twice ſeen this in the beds of rivers, as of the Nen near Peterborough, and Hackney river near London; but this ſpecimen was from one of the gravel pits near Oxford, where it is very plentifully intermix'd with the gravel.

2. *Arena craſſiſſima, ſplendida, pallide fuſca.*
Coarſe, ſhining, pale brown Sand.

This is a very bright and beautiful Sand, common in the gravel pits and beds of rivers, but ſeldom found among the ſtrata of Sand. It is very coarſe and large, conſiderably heavy, and of a very faint pale brown, with a great deal of brightneſs; its particles appear tolerably uniform, and regular in ſize: It feels very harſh and cutting between the fingers, and ſhook up in water, ſubſides immediately without leaving the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears an aſſemblage of variouſly ſhap'd and differently colour'd particles, ſome are opake and blueiſh, others ſomewhat pellucid and inclining to yellow; but the greater number are of the ſhape of Pebbles of tolerably ſmooth ſurfaces, moderately bright and tranſparent, and of different degrees of a pale brown, many ſo faintly ting'd with it as to appear to the Microſcope abſolutely colourleſs; among theſe there are plainly diſcoverable as in the former, many fragments of a cubic Spar, perfectly white, and conſiderably bright and tranſparent.

It makes a ſlight effervescence with Aqua Fortis, which is wholly owing to theſe ſparry particles.

It burns to a very pale greyiſh red.

It is common among gravel, and in the beds of rivers; I have once or twice in Suſſex met with it in thin ſtrata, at conſiderable depths, but that is not common.

SECT. V. The Black SANDS.

1. *Arena tenuior, ſplendida, grizeo nigreſcens.*
Fine, ſhining, greyiſh black Sand.

This is a very elegant and beautiful Sand; it is perfectly pure, and conſiderably fine and heavy, and of a very pleaſing colour, a bright greyiſh black: It has a remarkably clean and lively look, its particles are very uniform in ſhape and ſize, and of conſiderable brightneſs: If rubb'd between the fingers, it feels very ſharp and cutting, and ſhook up in water ſettles but ſlowly, but leaves not the leaſt foulneſs in it.

Examin'd by the Microſcope, it appears a congeries of particles much of the ſame ſize and figure, they are very bright, and perfectly tranſparent, of an obtuſely angular figure; and what is very remarkable, appear entirely colourleſs.

It makes no effervescence with Aqua Fortis.

It burns to a pale red.

I receiv'd it from Italy, where it is common on the ſhores, and in pits in the inland parts of the kingdom; I have not met with it in England, nor indeed ſo much as heard of it any where but there.

2. *Arena tenuior, ſplendidiſſima, nigro rubeſcens.*
Fine, ſhining, reddiſh black Sand.

This is one of the moſt elegant and beautiful Sands we know; it is very fine and clean, conſiderably heavy, of a moſt agreeable colour, a fine ſhining black mottled, and variegated with pale red, fleſh-colour and white, for there are many particles of all theſe colours, plainly diſtinguiſhable by the naked eye; it is not only the moſt beautifully colour'd, but the brighteſt and moſt ſhining of all the native pure Sands; and this brightneſs is not adventitious as in many of the Talcy Sands, but is the true ſplendour of its own particles; its conſtituent particles are pretty regular in ſize, tho' very different in ſhape; the black ones appearing roundiſh, and the others flat: It feels very ſharp and cutting between the fingers, and ſhook up in water ſettles very quickly, and leaves not the leaſt muddineſs in it.

Examin'd by the Microſcope, it affords a moſt pleaſing object, the whole having no other appearance than that of a cluſter of the different Gems; the black particles are almoſt entirely opake, of ſmooth ſurfaces, and approaching to roundneſs in figure; the others are all very bright, perfectly tranſparent, many of them roundiſh, and many flat, and of a moſt pleaſing variety of colours; the red are ting'd in all degrees, and with different admixtures in the ſame colour, ſome reſembling Garnets, ſome Amethyſts, and others Hyacinths; there are many particles ſo faintly ting'd as to appear perfectly colourleſs to the Microſcope, and ſome others of an equal brightneſs and tranſparency that are ting'd to a reſemblance of Topazes and Aqua Marines.

It makes no effervescence with Aqua Fortis.

It ſuffers ſcarce any change of colour in the fire.

It is as far as we yet know peculiar to America, from ſeveral parts of which it has been ſent, by John Bartram, and others; and is found in ſome places on the ſides of hills, and in others on the ſhores of rivers.

SECT. VI. Green SAND.

Arena craſſior, ſordide virens, albo variegata.
Coarſe, variegated, duſky green Sand.

This is one of the moſt ſingular bodies of this numerous Claſs; it is conſiderably large and coarſe, moderately heavy, and of a ſtrong but dull green, variegated with white particles in a conſiderable number; the particles are all very much of a ſize, but very different in ſhape; the green ones appearing to the unaſſiſted eye roundiſh, and the white ones angular; the former are dull and deſtitute of brightneſs, but thoſe of the latter kind, and among them ſome that are more perfectly colourleſs, are conſiderably bright and glittering. It feels leſs harſh than moſt of the Sands between the fingers, and ſhook up in water, ſubſides immediately, and leaves not the leaſt foulneſs in it.

Examin'd by the Microſcope, the particles appear extreamly different from one another; the whitiſh are of two kinds, ſome ſemi-pellucid and cloudy, and obtuſely angular, others more ſharply ridg'd, and bright and colourleſs as Cryſtal. There are beſide a few ting'd with a faint yellow; all theſe, however, make but a ſmall part of the maſs, the principal quality of which is of the green ones, and theſe are the moſt ſingular bodies I have met with, being entirely different from every thing elſe of the arenaceous kind. They are obſcurely tranſparent, and of a deep, but ſomething yellowiſh green, approaching to the texture and colour of ſome of the Jaſpers, but are evidently no fragments of any kind, but each a diſtinct, ſmall, perfect and ſmooth maſs; they are of various ſhapes, but all approaching to either ſingle round lumps, or botryoide cluſters of ſuch, and are all divided into a number of Tali, or ſmall Teſſeræ, by Septa of a whitiſh Spar pervading their whole ſubſtance in ſome, and only lodg'd ſuperficially on others, but giving each the appearance of a ſmall and elegantly divided Septaria, or Ludus Helmontii.

It makes no effervеſcence with Aqua Fortis.

It burns to a pale greyiſh red, loſing all its greenneſs.

I receiv'd it from Virginia, where it is common both in ſtrata, and on the ſhores.

SERIES III.

CLASS IV. ORDER II. GENUS I.

SABURRÆ. GRITTS.

Foſſils found in minute maſſes, forming together a kind of powder; the ſeveral particles of which are of no determinate ſhape, nor have any tendency to the figure of Cryſtal, but ſeem the rudely broken fragments of larger maſſes; not to be diſſolved or diſunited by water, but retaining their figure in it, and not cohering by means of it into a maſs: conſiderably opake, and in many ſpecies fermenting with Acids; often foul'd with heterogene matters, and not unfrequently taking in the coarſer ſtony, mineral and metalline particles; and hence, as well as from their ſeveral colours, ſubject to various ſub-diviſions into Sections.

SECT. I. The white ſtony Gritts (a) thoſe conſiſting of pure Spar.

1. *Saburra ſaxea, nivea, tenuior.*
Fine, ſnow white, ſtony Gritt.

THIS is one of the moſt beautiful and elegant Foſſils of this Claſs. It is a perfectly pure and homogene maſs, very fine and ſmall, of conſiderable weight, and of a pure ſnow white. It is very bright and ſparkling; its particles are very regular in ſize; it feels very hard and harſh between the fingers, and ſhook up in water ſettles immediately, and leaves not the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of ſimilar particles, all of ſnow white, and very pellucid, but without the cryſtalline water of the finer genuine white Sands.

It makes a violent effervеſcence with Aqua Fortis.

It burns to an opake white.

I found it in two different places on Mendip Hills in Somerſetſhire, lodg'd in perpendicular fiſſures of the ſtrata of ſtone, and have never ſeen or heard of it elſewhere.

It ſeems compos'd ſolely of the diſunited particles of a very fine Spar.

2. *Saburra ſaxea, alba, craſſior, hebes.*
Dull, coarſe, white, ſtony Gritt.

This is a very elegant and beautiful Gritt, but greatly inferior to the former. It is found perfectly pure, conſiderably hard and coarſe, moderately heavy, and of a pure, but dead white, and has very little brightneſs; its particles are very regular in ſize; it feels very hard, but not harſh or cutting between the fingers, and ſhook up in water, ſettles immediately, and leaves a little milkyneſs in it.

Examin'd by the Microſcope, it appears a congeries of large, coarſe particles, ſemipellucid, of very little brightneſs, and of a pure white; they are all rude fragments of rhomboidal figures.

It ferments pretty briſkly with Aqua Fortis.

It ſuffers no change of colour in the fire.

I found it in conſiderable plenty in the perpendicular fiſſures in many places on Mendip Hills, but never in the ſame fiſſures, nor ever mix'd with the former.

It ſeems evidently to be compos'd of fragments of a very white, opake, ſparry body.

3. *Saburra ſaxea, tenuis, ex albo paululum, flaveſcens.*
Fine cream colour'd, ſtony Gritt.

This is another of the elegant and beautiful bodies of this Claſs. It is conſiderably fine, very heavy, and of a fine yellowiſh white, or pretty exactly what we call a cream colour. It is remarkably bright and ſparkling, and that not from adventitious, but from its own native particles, for it is perfectly pure; its particles are irregular in ſize; it feels very harſh and ſharp between the fingers, and ſhook up in water ſubſides immediately, leaving a little milkyneſs in it.

Examin'd by the Microſcope, it appears an aſſemblage of particles, ſomewhat different in ſize and ſhape, yet all approaching to a rhomboidal form, ſome are flat, ſome oblong, and others very thick; theſe laſt, if view'd ſideways, ſhew themſelves to be fiſſile like the Talcs, only not into ſuch thin plates, and they are all of a good tranſparency, conſiderably bright, and almoſt perfectly colourleſs.

It ferments violently with Aqua Fortis.

It calcines into a pale grey, with very little tranſparence.

I receiv'd it from one of the iſlands in the Archipelago, the gentleman who favour'd me with it, had forgot which, but inform'd me that it runs down a hill out of the crack of a rock.

It ſeems compos'd of the diſunited particles of a fine Spar, ting'd ſlightly with lead.

(b) White ſtony Gritts, conſiſting of Spar mix'd with cryſtalline, talcy and other particles.

1. *Saburra ſaxea, alba, ſplendida, craſſiſſima.*
Bright, coarſe, white, ſtony Gritt.

This is a very coarſe and impure Gritt, manifeſtly conſiſting of two different ſets of particles. It is remarkably large and coarſe, very heavy, of a duſky white colour, but glittering very brightly in ſome places; its conſtituent particles are all large, but irregular in ſize, ſhape and colour, and plainly appear ſo to the naked eye; it feels very hard, harſh and cutting between the fingers, and ſhook up in water, leaves a ſlight milky foulneſs in it.

Examin'd by the Microſcope, it appears compos'd of cryſtalline and ſparry particles, confuſedly mingled; the former approach to an angular figure, are perfectly colourleſs and pellucid, and of a fine brightneſs and water; the other are white, and rudely approach to a rhomboidal figure, and are very opake.

It ferments ſtrongly with Aqua Fortis.

It burns to a very pale fleſh colour, or whitiſh red.

I found a thin ſtratum of this near Loughborough in Leiceſterſhire, and never met with it elſewhere; it lay at about ſeven foot deep, under gravel.

It ſeems the looſe matter of ſome fine ſtratum of ſtone.

2. *Saburra ſaxea, craſſiſſima, alba, micacea.*
White, coarſe, ſtony Gritt, with micæ.

This is a very gay and glittering ſubſtance, found plentifully on the ſhores in ſome places, but no where that I have heard of in a ſtratum. It is very large and coarſe, conſiderably heavy, and of a pure white, with black, yellow and white flakes of a foliaceous Talc; the other particles which compoſe it have little or no brightneſs, and are very irregular in ſize; it feels very harſh and gritty between the fingers, and ſhook up in water, ſettles immediately, but leaves a little whiteneſs in it.

Examin'd by the Microſcope, it appears an aſſemblage of large, irregular particles, moderately tranſparent, and very white; they are of various figures, ſome thick, ſome flattiſh, but all ſeemingly of the ſame texture and hardneſs; among theſe are ſcatter'd a vaſt number of fine thin fragments of three kinds of foliaceous Talcs, a perfectly pellucid white, a ſomewhat opake yellowiſh, and more opake browniſh black; all theſe are of very gloſſy ſurfaces, and make a fine gay appearance, both before the Microſcope, and to the naked eye.

It makes not the leaſt effervеſcence with Aqua Fortis.

It burns to a pale red.

I receiv'd it from Wales, where it is common on the ſea ſhores under the cliffs; it ſeems to be the diſunited maſs of one of the ſtones, known by the name of Micæ; and I doubt not if a proper ſearch was made in the cliffs, that a looſe ſtone of this kind wou'd be found in them, which the waves beat out into this form.

3. *Saburra ſaxea, albida, tenuis, hebes.*
Dull, white, fine, ſtony Gritt.

This is greatly inferior to the kinds hitherto deſcrib'd in beauty. It is conſiderably fine, moderately heavy, of a dull dead whitiſh colour, and almoſt wholly without brightneſs. Its particles ſeem very regular and alike in ſize; it feels rough between the fingers, and ſhook up in water ſubſides very quickly, and leaves a conſiderable foulneſs in it.

Examin'd by the Microſcope, it appears compos'd of whitiſh opake particles, of rough ſurfaces, of no determinate ſhape, and here and there diſcovering a lucid ſpeck of the brightneſs of Cryſtal on their ſurfaces.

It ferments violently with Aqua Fortis.

It burns to a pure white.

It is common in Northamptonſhire, Derbyſhire, and other places where there are ſtrata of ſtone; it is found uſually at the ſame depth that thoſe ſtrata are, and in beds of about equal thickneſs to theirs; there is no room to doubt but it is the looſe matter of ſuch coarſe ſtone.

4. *Saburra ſaxea, albo-griſea, craſſior, hebes.*
Dull, greyiſh white, coarſe, ſtony Gritt.

This is a coarſe and dull Gritt, found in immenſe ſtrata in ſome places; it is very large, hard and coarſe, moderately heavy, of a dull greyiſh white, and altogether deſtitute of brightneſs; its particles are very irregular in ſize and ſhape; it feels very coarſe and hard, but not ſharp between the fingers, and ſhook up in water ſettles immediately, and leaves a conſiderable muddineſs in it.

Examin'd by the Microſcope, it appears a maſs of very coarſe and irregular particles, of rough, and as it were ſpungy ſurfaces, perfectly opake, but here and there glittering with extreamly ſmall cryſtalline ſparks.

It ferments much more ſtrongly than any of the former in Aqua Fortis.

It burns to a pure white.

It is common in Yorkſhire and ſome other counties, where they find vaſt ſtrata of it in the hills, and always ſtone of the ſame colour near it; there is no doubt of its being the diſunited matter of a coarſe ſtone.

5. *Saburra ſaxea, albo-fuſca, tenuis, hebes.*
Fine, dull, browniſh-white, ſtony Gritt.

This is a ſubſtance of the ſame kind with the two former, owing its origin to the ſame ſpecies of matter, tho' of a different colour and conſiſtence. It is moderately fine, not very heavy, of a browniſh white colour, and perfectly deſtitute of brightneſs; its conſtituent particles are very irregular in ſize and ſhape; it feels leſs hard between the fingers than many of the others, and ſhook up in water leaves a browniſh muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of particles of a more looſe and ſpungy texture than thoſe of any of the others, of uncertain ſhapes, and unequal ſurfaces, and like the reſt of this kind, in general perfectly opake, but glittering with ſmall ſparkles in ſome particular places.

I collected it in Mr. Allen's great ſtone quarry at Bath, it lay in many accidental cavities among the ſtone, and doubtleſs was no other than its particles in a diſunited ſtate.

It ferments briſkly with Aqua Fortis.

It burns to a deep duſky brown.

I have receiv'd this ſpecies ſince from Leiceſterſhire, where alſo it is common.

6. *Saburra ſaxea, tenuis, albido-grizea, micacea.*
Fine, glittering, greyiſh-white, ſtony Gritt.

This is a glittering and agreeably colour'd Gritt, always found in the neighbourhood of Stone; it is conſiderably fine, moderately heavy, and of an agreeable pale greyiſh-white, glittering with fine white ſpangles; its particles are very unequal in ſize, and the far greater number of them appear, to the naked eye, abſolutely dull, and deſtitute of brightneſs; the glittering being owing to a multitude of ſmall flakes, of a fine foliaceous Talc, mix'd in very conſiderable quantity with the reſt; it feels harſh and cutting between the fingers, and ſhook up in water, ſettles but ſlowly, and leaves a whitiſh muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of a multitude of unequal and irregular particles, of very different ſizes, and no determinate ſhape, perfectly opake in moſt parts of their ſurfaces, but here and there glittering with ſmall cryſtalline ſparks; theſe are of a pale, whitiſh grey; and among theſe are, very thickly interſpers'd, ſmall and thin flakes, of a very pellucid, white, foliaceous Talc.

It makes a violent efferveſcence with Aqua Fortis.

It calcines to a paler grey.

It is common in the hills of Yorkſhire, where there is ſtone of the ſame colour, and nothing is more frequent than to ſee a long ſtream of it running down the hills: This leaves no room to doubt that it owes its origin to the diſunited matter of ſtone.

7. *Saburra ſaxea, micacea, tenuis, albido-vireſcens.*
Fine, greeniſh-white, ſpangled, ſtony Gritt.

This is of like origin, tho' not of the ſame texture and conſtitution with the three or four former; it is moderately fine, of great weight, and of a very pretty duſky, greeniſh white colour; its conſtituent particles are very irregular in ſize, and the greater quantity ſeem perfectly dull, the brightneſs of the maſs being owing to a great number of broad and flat Talcy ſpangles; it has but little harſhneſs between the fingers, and ſhook up in water ſubſides ſlowly, and leaves a greyiſh muddineſs in it.

Examin'd by the Microſcope, it appears to be compos'd of ſtony particles, of very different ſhapes and bigneſs, but all of a kind, and all very different from thoſe of any of the former ſpecies, being moderately pellucid and bright, and of a pale greeniſh white; among theſe are interſpers'd a vaſt number of flakes, of a fine white foliaceous Talc, which make a very pleaſing variety in the object.

It makes not the leaſt effervescence with Aqua Fortis.

In the fire it acquires a pale browniſh colour.

I obſerv'd a ſtratum of it in the ſide of the hollow'd road from Bath to Sherborn, and at a little diſtance a continuation of a ſtratum of the ſame colour, and at the ſame depth, but of a very pretty laminated ſlaty ſtone; on this I trac'd it back, and had the ſatisfaction to find it, at ſome ſmall diſtance, become ſofter, and more lax; a little farther it ſcarce held together; and at a very ſmall diſtance beyond that, was in the form of this looſe Sand: the ſame ſpecies I have alſo obſerv'd near Loughborough in Leiceſterſhire, under ſome large ſtones of the ſame kind in a riſing ground. There are ſpecimens of the ſtone to be deſcrib'd hereafter, which I collected in both theſe places, and which inconteſtibly prove its being no other than this Gritt in a compact form, or this no other than the ſtone in a diſunited ſtate; in the firſt inſtance perhaps it may be ſafely affirm'd to have lain originally looſe; in the other, probably the weather may have moulder'd it away from the ſtone.

8. *Saburra ſaxea, craſſior, grizeò-vireſcens, hebes.*
Dull, coarſe, greeniſh-grey, ſtony Gritt.

This is a coarſe and unpleaſant colour'd Gritt; it is very large and harſh, moderately heavy, and of a dull greeniſh grey, with a very few ſpangles of Talc intermix'd, and thoſe very ſmall; it is ſomewhat ſingular in this, that the ſpangles, which in all the reſt are at leaſt equal in breadth to the ſtony particles, and in moſt much broader, are in this extreamly ſmall, and ſcarce diſcernable; its particles are tolerably uniform and regular in ſize; it feels very harſh and rough between the fingers, and ſhook up in water ſubſides very quick, and leaves no muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of large, coarſe, whitiſh particles, in ſome degree pellucid, but without brightneſs in general, but here and there ſpangled with a cryſtalline ſpeck, as is the caſe in many of theſe when view'd before the Microſcope; among theſe ſtony particles are interſpers'd a few ſmall pieces of a foliaceous bright Talc.

It makes no effervescence with Aqua Fortis.

It burns to a faint duſky red.

It is common in the hills of Yorkſhire, and in many other places.

9. *Saburra tenuiſſima grizea hebes. Quæ Pulvis Puteolanus Antiquorum.*
Fine, dull-looking grey Gritt. The Pulvis Puteolanus of the Antients.

This is the Pulvis Puteolanus, Plin. v. 2. p. 713. Aldrov. Muſ. Met. 220. Charlt. 220. Iſidor. l. 16. c. 1. Vitruv. l. 2. c. 6.

This is extreamly different from all the other bodies of this claſs; it is not compos'd of ſingle looſe particles, of ſomething like a determinate ſize, as all the others both genuine Sands and Gritts are, but is a kind of greyiſh powder, compos'd of particles of all ſizes, but in general ſo extreamly minute, as to eſcape the diſtinction of the beſt glaſſes, and appear to them hanging together in form of duſt; it is extreamly fine, leſs heavy than moſt of this claſs, of a pale greyiſh colour, and perfectly dull, and deſtitute of brightneſs in itſelf, but ſpangled with a ſmall number of particles of a gloſſy foliaceous Talc; it feels moderately coarſe between the fingers, and ſhook up in water ſubſides very ſlowly, and leaves a white muddineſs in great quantity in it; what is its remarkable quality, however, and which eſſentially diſtinguiſhes it from all other Foſſils of this claſs, is, that if wetted with ſalt water, into mortar or paſte, inſtead of remaining wet and incoherent, as all other bodies of this claſs do, it dries almoſt immediately, and coaleſces into a hard ſtony maſs, ſuch as is not eaſily afterwards diſunited by water; it does the ſame, in ſome meaſure, if mix'd with common water, but is leſs hard in the wet afterwards, and ſucceeds leſs if the water be heated, than in either of the other caſes.

The Antients were well acquainted with this ſubſtance and its properties. Pliny, ſpeaking of the value of ſome earths, ſays, *Quis enim ſatis miretur peſſimam ejus partem ideoque pulverem apellatum in Puteolanis collibus opponi maris fluctibus merſumque, proti-*

nus fieri lapidem unum inexpugnabilem undis & fortiorem quotidie. Iſidore alſo affirms the ſame in the ſame words; and Seneca has commemorated it in as expreſs terms, *Puteolanus Pulvis ſi aquam attigit ſaxum eſt.* And Aldrovandus has ſince given it as expreſſly, *Pulvis Puteolanus quandoquidem ab aqua maris contactus in Lapidem vertitur.* In regard to theſe accounts, however, I muſt obſerve, that I have not been able to make the ſubſtance ſucceed on trials, as they ſeem to promiſe, that is, that if immers'd in water, and ſuffer'd to remain under it, it will there become a hard ſtone, and I am apt to believe theſe authors ſpoke inaccurately in affirming this: The powder was continually running down the ſides of hills into the ſea, and probably lodg'd on their ſides in large quantities in many places; theſe, if wetted in ſtorms or high tides, I am very ſenſible would afterwards coaleſce into hard ſtony maſſes, and with theſe probably the ſides of the hills were fill'd as far as was in high tides or ſtorms within the reach of the ſea; and theſe, I doubt not, were what the Ancients ſaw, and very juſtly deſcrib'd as the powder turn'd into ſtone; they hardly look'd under water, to ſee what became of ſuch of it as fell thither, and if they had, I doubt not but they would have found it in powder. As to the maſſes of it, indurated, and lying above the common reach of the water; theſe were unqueſtionably (as they naturally indeed muſt have been) what they form'd their deſcriptions and accounts from, and in this ſenſe the preſent experiments, with the ſame matter, abſolutely bear them out. Its principal uſe, among the Antients, was to mix among their cements us'd in buildings ſunk into the ſea, for which it muſt have been an excellently uſeful thing; and it is at preſent, in many parts of France and Italy, well known as an ingredient in their harder plaiſters under the name of Pozzolane.

This remarkable quality in it, is probably owing to its being the looſe Gritt of ſome ſtone, into the compoſition of which, there has enter'd a conſiderable quantity of that earth, known in all ages and almoſt in all countries for coaleſcing into a kind of plaiſter without previous burning, known to the Antients under the name of Gypſum Tymphanum, and to ſome of the moderns under that of Calx nativa; as a proper admixture of this wou'd certainly diſpoſe the Gritt of any ſoft ſtone to have theſe qualities in the mixture.

View'd by the Microſcope, this appears only an irregular heap of greyiſh duſt, ſpangl'd with a few flakes of Talc; it burns to a fine pale red, which is a proof that it has not been acted upon by ſubterranean fires before, as might naturally enough elſe be ſuſpected.

It makes no efferveſcence with Aqua Fortis, whence it is plain that it contains no ſparry or cretaceous matter, and that its Gypſine particles, tho' of the ſame nature, are far from being in the ſame ſtate with thoſe of our Calx nativa.

I receiv'd it from Italy, where it is common on the ſides of hills, as our Saburræ are in Yorkſhire.

SECT. II. Red Stony GRITTS.

(a) Conſiſting of pure, homogene, ſparry or cryſtalline particles.

1. *Saburra ſaxea, tenuis, pallide rubeſcens.*
Fine, pale red, ſtony Gritt.

This is a very elegant and beautiful maſs, moderately fine, conſiderably heavy, and of a very pale whitiſh, or browniſh red, the colour appearing made up of a pale red, pale brown, and very bright white; it is very bright and ſparkling, even more ſo than many of the genuine Sands; it feels very harſh, hard and rough between the fingers, and ſhook up in water ſubſides immediately, and leaves not the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of very irregularly ſhap'd particles, ſome pale red, ſome browniſh, and others colourleſs, of different degrees of brightneſs and tranſparency, and moſt of them of angular figures.

It raiſes a ſlight efferveſcence with Aqua Fortis.

It ſuffers very little change of colour in the fire.

I found a ſtratum of it near Briſtol, and at ſome ſmall diſtance from it another of a like ſtone, of which I have ſpecimens hereafter to be deſcrib'd exactly at the ſame depth.

2. *Saburra ſaxea, ſplendida, craſſior, pallide rubens.*
Coarſe, ſhining, pale red, ſtone Gritt.

This is a very pure and elegant maſs, very large and coarſe, conſiderably heavy, and of a pale whitiſh red; its particles are very uniform and regular in ſize, and of a very beautiful and remarkable brightneſs; it feels extreamly hard and harſh between the fingers, and ſhook up in water ſubſides in a moment, without leaving the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of irregularly ſhap'd, but very beautiful cryſtalline particles; they are all perfectly pellucid, and of a fine water, ſome colourleſs, and others of a very pale red in different degrees; the colourleſs particles are ſomething brighter, and more pellucid than the others, and all appear fragments of angular bodies.

It makes no efferveſcence with Aqua Fortis.

It ſuffers ſcarce any change in the fire, becoming, if any thing, only a little whiter than before.

It is found in ſome places on the coaſt of Fife, and appears to me to be the diſunited matter of a pale but very beautiful porphyry.

3. *Saburra ſaxea, ſplendida, craſſa, grizeo-rubeſcens.*
Coarſe, ſhining, greyiſh-red, ſtony Gritt.

This is a very impure and conſiderably coarſe Gritt, very heavy, and of a pale and variegated greyiſh red. Its particles are of very various ſhapes and ſizes, but many of them very bright and ſhining, and ſome others perfectly opake; it feels very hard, harſh and rough between the fingers, and ſhook up in water ſubſides in a moment, without leaving the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of very differently ſhap'd and ſiz'd particles, ſeveral of them being white, very opake, and ſeeming fragments of rhomboidal figures; others perfectly colourleſs and pellucid, appearing angular and cryſtalline, others of a middle nature between theſe, and ſtain'd with a faint red, and a fourth ſort perfectly opake and whitiſh, and looking like ſmall fragments of a coarſe ſtone.

It makes a ſtrong efferveſcence with Aqua Fortis.

It burns to a very beautiful red.

I receiv'd it from the ſhores of Minorca, where there is a very ſingular kind of Cæmenta, to be deſcrib'd hereafter, very common alſo, and of which theſe are evidently no other than the diſunited particles.

4. *Saburra craſſiſſima, hebes, carneo vireſcens.*
Coarſe, greeniſh red, dull Gritt.

This is a very beautiful, tho' not a bright maſs. It is remarkably large and coarſe, very heavy, and of an elegant fleſh colour, variegated with green; but has little or ſcarce any brightneſs; its particles are tolerably uniform and regular in ſize; it feels very hard, but not ſo ſharp as ſome others between the fingers, and ſhook up in water ſubſides immediately, and leaves no muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of particles, of irregularly angular figures, but in general approaching to an oblong form, and often flattiſh; ſome of theſe are whitiſh, others of elegant pale reds, and others of a very beautiful light green, all equally and moderately tranſparent, but with very little brightneſs.

It makes no efferveſcence with Aqua Fortis.

It burns to a ſomewhat paler colour.

I receiv'd it from the ſhores of the Mediterranean, but could not learn the particular place: It ſeems evidently the looſe matter of ſome ſtone, but ſeems to belong to one not known, or deſcrib'd by any author.

5. *Saburra tenuior, ſplendida, ferruginea.*
Fine, ſhining, ferrugineous Gritt.

This is a very bright and glittering maſs, and of a very ſingular colour. It is conſiderably fine, extreamly heavy, and of a colour reſembling that of ruſty iron, but much darker, and without the yellowneſs that has, and ſpangled all over with very bright glittering particles, which might eaſily be miſtaken for flakes of Talcs, but are in reality no other than pure and colourleſs cryſtalline fragments; its particles are very equal in ſize, tho' ſo different in colour. It feels extreamly harſh and ſharp between the fingers, and ſhook up in water ſubſides very quickly, leaving not the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of very differently colour'd particles, but all of ſharp, angular figures; ſome are whitiſh, others yellowiſh and ſemi-pellucid, others colourleſs and bright as Cryſtal, but the greateſt number are brown in different degrees, ſome ſlightly pellucid, but moſt perfectly opake.

It makes no effervefcence with Aqua Fortis.

It burns to a ſomething deeper brown.

I receiv'd it from Liſbon, where it is common under rocks of Emery, Magnets, and other ferrugineous matter.

(b) Red ſtony Gritts, conſiſting of ſparry, cryſtalline and talcy particles, and forming bright and beautifully variegated maſſes.

1. *Saburra ſaxea, tenuis, micacea, rubra.*
Fine, red, ſtony Gritt, with micæ.

This is a very fine and beautiful maſs; It is moderately ſmall, of very great weight, and of a pleaſing red colour, with a caſt of whitiſh; its ſtony particles have ſome degree of brightneſs in themſelves; but the whole is render'd very bright and ſparkling, by a plentiful admixture of extreamly bright and glittering flat ſpangles. The particles are all very regular and uniform in ſize, the ſpangles not exceeding the ſtony maſſes in breadth; it feels very rough and ſharp between the fingers, and ſhook up in water ſettles immediately, without leaving the leaſt foulneſs in it.

Examin'd by the Microſcope, it appears a congeries of bright and pellucid amethyſtine Cryſtals, of a pale red, all approaching to an angular figure, and in many places form'd into ſmall cluſters, every where interſpers'd with particles of a very bright and perfectly pellucid, browniſh white Talc: The whole making a very beautiful appearance both to the naked and aſſiſted eye.

It makes no effervefcence with Aqua Fortis.

It ſuffers no change of colour in the fire.

I receiv'd it from Minorca, where there are great quantities of it in different places on the ſea ſhore; and on enquiry, I find there is a very beautiful red ſtone, common among the rocks there, and that the parcels of this Sand are always immediately under them, and unqueſtionably they are waſh'd from them.

2. *Saburra micacea, craſſior, rubra, variegata.*
Coarſe, red, variegated Gritt, with micæ.

This is a moſt bright and elegant maſs, conſiderably large and coarſe, very heavy and of a moſt beautifully variegated colour, of which red may be moſt properly accounted the baſis, as the greater number of particles are of the different degrees of that colour; theſe in their various tinges make the body of the maſs, and are in themſelves very bright and ſparkling; but beſide that, are much enliven'd by a plentiful admixture of white cryſtalline fragments, and a vaſt variety of white, yellow and black flakes of foliaceous Talcs, which are all very glittering, and make with the common matter of the maſs, a moſt pleaſing glow of a variegated ſplendour; theſe particles are all very much of a ſize, the whole feels extreamly hard, harſh and rough between the fingers, and ſhook up in water ſubſides in a moment without leaving the leaſt muddineſs in it.

It leſs needs a Microſcopic examination than many other things of this kind, for if thinly ſpread on paper, the unaſſiſted eye diſcovers its texture and compoſition very clearly; what the Microſcope gives, is only a more certain view, the ſtony particles appear very bright, clear and pellucid, obtuſely and irregularly angular, and either perfectly colourleſs or ting'd with different degrees of red, and of different degrees of brightneſs and tranſparency; the white ſpangles are flakes of a very fine white pellucid foliaceous Talc; there are beſide theſe, yellow and black ſpangles of the ſame ſubſtance, and the laſt very numerous, and often in thick pieces.

It makes no effervescence with Aqua Fortis.

It burns to a ſomething ſtronger red.

I have this and the three or four following from the ſhores of the Iſlands on the Scotch coaſt, where they are extreamly plentiful, and in the ſunſhine make a very gay and beautiful appearance, to which I owe the notice the Gentleman took of them who brought them to me; they ſeem to me to be evidently the diſunited matter of fine granites, and I doubt not but ſuch ſtones would be found on ſearching in the cliffs; the texture and admixture of the fragments leaves no room to doubt their being of this ſtone, and its value may make it worth ſeeking after.

3. *Saburra micacea, craſſiſſima, & ſplendidiſſima, carnea variegata.*
Large, bright, fleſh-colour'd variegated Gritt, with Micæ.

This is a more elegant, bright and beautiful maſs than the former; it is very remarkably large and coarſe, conſiderably heavy, and of a moſt lively pale red, or fleſh-colour, variegated with black and brown Talcy particles, and white cryſtalline ones; every particle of the maſs is very bright and glittering, and the whole in a bright ſunſhine too dazling to be look'd on; the particles it is compos'd of are very uniform and regular in ſize; it feels remarkably hard and harſh between the fingers, and ſhook up in water ſinks immediately without leaving the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of a moſt pleaſing variety of particles, all large and coarſe, but of very different figures and colours; part are irregularly angular, moderately bright and pellucid, and ſtain'd with reddiſh and yellowiſh, others are perfectly colourleſs, and very bright, and others blackiſh and reddiſh, and opake; among theſe are interſpers'd a multitude of flaky ſpangles, of a brown and a black very gloſſy Talc, which give a great brightneſs and very pleaſing variety to the whole, but there are no white or yellow ſpangles.

It makes no effervescence with Aqua Fortis.

It burns to a ſomething ſtronger red.

It is common on the Shores of the Northern Iſlands, and is evidently the diſunited matter of a very fine Granite.

4. *Saburra micacea tenuis, fuſco rubra, variegata.*
Fine, browniſh red, variegated micaceous Gritt.

This is a very elegant but leſs glaring maſs than either of the former; it is very fine, extreamly heavy, and of a faint browniſh red, variegated with white, black and yellow; its conſtituent particles are all very bright and glittering, and nearly all of a ſize; it feels very ſharp and cutting between the fingers, and ſhook up in water ſubſides ſlowly, but leaves not the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a moſt elegant and beautiful object, compos'd of particles of very irregular ſhapes, but all much of a ſize, ſome ſeem ſparry, ſemi-opake, whitiſh, reddiſh, or browniſh; others cryſtalline, colourleſs, reddiſh, or browniſh, and very bright, and others opake and ſtony; theſe laſt are in general blackiſh or reddiſh; among theſe the ſpangles make a very pleaſing variety, they are all flakes of foliaceous Talcs, ſome white, ſome yellow, ſome brown, and ſome black.

It makes a ſlight effervescence with Aqua Fortis.

It ſuffers no change in the fire.

It is common on the ſhores of the Northern Iſlands, and is evidently like the reſt, the looſe matter of a Granite.

5. *Saburra micacea, tenuior, carnea, variegata.*
Fine, fleſh-colour'd micaceous Gritt.

This is at leaſt equal in elegance and beauty to any of the former; it is very fine, and conſiderably heavy, of an elegant and bright fleſh-colour, very glittering in all its particles, and remarkably regular in their ſize; it is very elegantly but ſparingly, variegated with white and black; it feels very ſharp and harſh between the fingers, and ſhook up in water ſubſides immediately, without leaving the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of particles of very irregular figures, ſome white, ſome reddiſh, and others perfectly colourleſs, tranſparent in different degrees, but the greater part of them very bright; among theſe are interſpers'd flaky ſpangles of white, brown and black Talc, and a few blackiſh ſtony particles; the whole makes a very beautiful and elegant appearance, and is brighter both to the unaſſiſted eye and to the Microſcope, than moſt others of this Claſs.

It makes no efferveſcence with Aqua Fortis.

It burns to a paler colour.

It is common on the ſhores of the Northern Iſlands, and ſeems the looſe matter of a pale and very beautiful Granite.

6. *Saburra micacea, tenuiſſima, carneo albida, variegata.*
Fine, extreamly pale whitiſh red, variegated micaceous Gritt.

This is a very bright and beautiful maſs, tho' leſs gaily colour'd than ſome of the precedent; it is extreamly fine, very heavy, and of a very pale whitiſh fleſh colour, the red in it being in a very ſmall porportion, but caſting a viſible bluſh thro' it, and variegated with very numeous black ſpangles; the particles are all very bright and glittering, almoſt all of the ſame ſize, and the ſpangles remarkably thin and tender; it feels notwithſtanding its extream fineneſs, very ſharp and cutting between the fingers, and ſhook up in water ſinks very ſlowly, but leaves not the leaſt muddineſs in it.

Examin'd before the Microſcope, it appears a congeries of pellucid particles, almoſt all of them very bright and ſparkling, moſt of them ſeemingly wholly colourleſs; and thoſe that are colour'd, ting'd with red only, and that in much the ſame degree; among theſe are interſpers'd a multitude of black ſpangles which are flakes of black Talc, and ſome few opake black fragments of ſtone.

It makes no effervescence with Aqua Fortis.

It burns to a ſpangled grey with ſcarce any redneſs.

It is common with the foregoing on the ſhores of the Northern Iſlands; they are a very elegant Claſs of bodies, and not that I know of ever deſcrib'd before; I receiv'd with them ſeveral ſlight varieties, but theſe here deſcrib'd are plainly diſtinct ſpecies, and are all that I have ſeen from that place; I have been inform'd of glittering Sands on the Northern coaſt of the Iſland of Guernſey, which probably are of theſe kinds; and have ſince the receipt of theſe, procured ſome other ſpecies from a different part of the world, by the following deſcription, of which it will appear that both they and the former are no other than Granites unconcreted.

7. *Saburra ſaxea, ſplendida, craſſa, carnea fuſca.*
Browniſh red, coarſe ſtony Gritt.

This is a very elegant and beautiful maſs, tho' leſs ſo than ſome of the preceding; it is ſomewhat large and coarſe, conſiderably heavy, and of a fine pale fleſh colour, variegated with brown, and ſpangled with a ſmall number of glittering flakes of a white Talc; its particles are very uniform and regular in ſize, and conſiderable bright and ſhining, ſo that with the advantage of the Talcy ſpangles, the whole appears very bright and glittering; it feels extreamly ſharp and harſh between the fingers, and ſhook up in water ſubſides immediately, and leaves a little muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of particles very much of a ſize, but extreamly different in ſhape, ſome being oblong, others roundiſh, others irregularly angular, but moſt of them flattiſh and bright, tho' not very tranſparent; they are of all the degrees of pale red from what we call fleſh-colour'd to abſolutely colourleſs; and the brown particles which make its ſlight variegation, are more pellucid than the reſt, of irregular figures, and of a browniſh yellow; among theſe there are ſcatter'd a few ſpangles of a white foliaceous Talc, very thin, and in general ſmaller than the other particles; theſe are in reality very few in number, tho' to an innacurate obſerver, the maſs to the naked eye may ſeem to contain a great number of them, many of its own particles having flat ſurfaces, and being very bright and colourleſs, and being not eaſily at firſt ſight diſtinguiſhable from Micæ; this is a miſtake ſome have fallen into in regard to ſome of the common Sands of England, but there is much more ground for it here.

This raiſes no effervеſcence with Aqua Fortis.

It burns to a ſomething paler red.

I receiv'd it from the ſhores of the Red Sea, where in ſome places there are long tracts of it, of four, five, or more feet in breadth running from the land into the ſea; the occaſion of this is eaſily gueſs'd, and I doubt not but there are Granites on that ſhore of the ſame colour.

8. *Saburra ſaxea, craſſiſſima ſplendida, carneo nigreſcens.*
Large, coarſe, blackiſh red, ſtony Gritt.

This is extreamly large and coarſe, and the moſt ſtrongly variegated of all this Claſs; it is remarkably heavy, of a colour mix'd of pale red and black, and conſiderably bright and ſhining in its own particles, beſide that, it is ſpangled with a ſmall number of black and white flakes of Talc which are in general ſmaller than the other particles; its different matter is very irregular in ſize; it feels remarkably hard and cutting between the fingers, and ſhook up in water ſubſides immediately, without leaving the leaſt muddineſs in it.

Examin'd before the Microſcope, it appears a heap of large particles of various colours, ſhapes and ſizes, ſome are white, others of all the degrees of a pale red, and a great number perfectly black and ſhining more than the reſt, tho' not at all pellucid; among theſe there are flakes of a blackiſh, and ſome of a white foliaceous Talc.

It makes no effervеſcence with Aqua Fortis.

It ſuffers not the leaſt change in the fire.

I receiv'd it from the ſhores of Sicily, where there is a prodigious bed of it which runs to an unknown depth into the Sea.

9. *Saburra ſaxea, ſplendida, craſſiſſima, rubro-vireſcens.*
Coarſe, ſhining, greeniſh-red, ſtony Gritt.

This is an extreamly ſingular, and very bright and beautiful Gritt; it is very large and coarſe, conſiderably heavy, and of a greeniſh red; but compos'd of ſuch large maſſes, that like the former and ſome others, it is diſtinctly ſeen to be compos'd of particles of both thoſe colours, and many white ones beſide; it is very bright and ſparkling in itſelf, and if cloſely examin'd is found to contain a few ſpangles of a greeniſh white Talc, very like the Venetian kind us'd in the ſhops; its particles, tho' ſo various in colour, are very uniform and regular in ſize; it feels very hard and ſharp between the fingers, and ſhook up in water ſubſides immediately, but leaves a reddiſh muddineſs in it.

Examin'd by the Microſcope, it appears compos'd of particles of very irregular figures, but all angular and all tending to flatneſs; they are green, white and red, all ſeeming of the ſame texture, and all equally tranſparent.

It makes a very briſk effervеſcence with Aqua Fortis.

It burns to a pale reddiſh grey, with very little remaining greeneſs.

I had it from ſome of the ſhores of the Mediterranean, but could not learn the exact place; by my enquiries about this, however, and all the others, I find they never cover whole ſhores, but are always either in ſeparate large patches, or in long trains from the land into the ſea; this very well agrees with my opinion as to their origin; they muſt in their concreted ſtate, however, be many of them, particularly this, ſuch very elegant ſtones, that it is much to be wiſh'd they were traced out and taken notice of.

Sect. III. Green ſtony Gritt, compos'd of homogene, ſparry particles.

1. *Saburra craſſior, hebes, læte virens. Quæ Cryſocolla Antiquorum.*

Coarſe, beautifully green, dull Gritt. The Chryſocolla of the Antients.

This is the Χρυσοκόλλα of Theoph. Ed. n. 70. as alſo of Dioſcorides, and the other Greek writers, and the Chryſocolla of Plin. v. 2. p. 620.

It is the moſt elegantly colour'd ſubſtance of all this beautiful claſs; it is ſomewhat coarſe, moderately heavy, and of the moſt lively and agreeable green imaginable, the emerald itſelf, in colour, does not at all exceed it; its particles are very uniform and regular in ſize, and almoſt entirely deſtitute of brightneſs; it feels leſs hard and harſh between the fingers, than moſt others of this claſs, and ſhook up in water ſubſides immediately, and leaves not the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of pure ſimilar particles, of irregularly and obtuſely angular figures, but in general approaching to a Rhomboidal form, very agreeably, tho' not perfectly tranſparent, and of a lovely green.

It makes a very ſtrong efferveſcence with Aqua Fortis, and tinges it with a blueiſh green.

In the fire it loſes all its greenneſs, and becomes of a duſky browniſh black.

This was given me by my moſt honoured friend Sir Hans Sloane, (a gentleman well known to the learned world, and in nothing more eminent than in his love to natural knowledge) to whom it was ſent from the ſhores of New England, under the name of a green Sand, made up of fragments of emeralds. Mr. Baker alſo has a ſpecimen of it from the ſhores of the red ſea, and I have heard of it in Ruſſia, and, as I hope, in England; but whether the Engliſh be the ſame with theſe, I cannot yet find opportunity of getting ſome to determine.

It had been long ſuppos'd, that the Chryſocolla of the Antients, which they us'd in ſoldering gold, as well as in medicine, was now a loſt Foſſil; but this Gritt is ſtill to be had in ſeveral places, and is unqueſtionably the very ſubſtance, as will appear from all their accounts of it. Theophraſtus tells us their Chryſocolla was a ſubſtance found in form of Sand, Τὰ δὲ ὅιον ἄμμου, καθάπερ χρυσοκολλα, p. 102. And Galen, that it was in form of powder; and as to its colour, Dioſcorides ſays, that it was perfectly green, Κατακόρως πρασιζουσαν. Galen, that it was of a fine green, and that the Armenian was accounted the beſt, becauſe it was the greeneſt; and Pliny, that it was *Coloris herbæ ſegetis læte virentis.* I had ventur'd, from theſe, and the other accounts of the Antients, in my notes on Theophraſtus, to determine the Chryſocolla of the Antients, tho' I had not, at that time, ſeen it to be a ſparry matter, in form of ſand, ting'd to a beautiful green by particles of copper, and in ſome degree reſembling a congeries of ſmall rough emeralds: This ſubſtance coming afterwards into my hands, prov'd the truth of that conjecture in all particulars, and may ſerve as a proof, that the knowledge of what the Foſſils of the Antients were, may be aſcertain'd from their own writings, notwithſtanding what many have aſſerted to the contrary. I had it try'd in ſoldering metals, and it was found to ſerve that purpoſe better than Borax, which is what we now uſe: in medicine I have found it poſſeſs the qualities of the Chryſocolla of the Antients, proving a violent emetick to a dog I gave it to; and its being a true Spar, tho' in this form is prov'd by its fermenting with acids, as is its owing its colour to copper, by its imparting a green tinge to the acids it is diſſolv'd in, which is, by means of a volatile or fix'd alkali, convertible into a ſky blue: Theſe were experiments I had the honour of making lately before the Royal Society, and which gave convincing proofs of the truth of the conjecture in regard to this ſubſtance; and as it may be had for carriage, it ſeems well worthy conſideration, as a new branch of commerce, ſince it ſupplies the place of ſo expenſive a drug on this occaſion.

2. *Saburra ſplendida, tenuis, pallide vireſcens.*
Fine, ſhining, pale-green Gritt.

This is a very elegant and beautiful maſs; it is very fine, and conſiderably heavy, of a very beautiful pale-green, variegated with white, and very bright and ſhining; its particles are very uniform and regular in ſize; it feels harſh and ſharp between the fingers, and, ſhook up in water, ſubſides immediately, without leaving the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of ſimilar particles, all irregularly and obtuſely angular, but tending to a long ſquare in figure; ſome of theſe are white, others of a pale fine green, and all very bright, and beautifully tranſparent.

It makes a violent efferveſcence with Aqua Fortis.

It burns to a browniſh white, without the leaſt remainder of green.

I receiv'd it from the ſhores of the red ſea, where it is very common. Dr. Woodward, vol. 2. C. of For. Foſſ. p. 3. mentions a green Sand from the Oſtia of the Nile, but, for want of a better account of it, it is impoſſible to determine which of theſe two, ſo very different ſubſtances, he meant.

SECT. IV. Yellow GRITT.

Saburra micacea, aurea, ſcintillans.
Shining, gold-colour'd, micaceous Gritt.

This is one of the gaudieſt of this claſs; it is very large and coarſe, not ſo heavy as moſt of the others, and of a fine bright, and glittering gold colour, being principally compos'd of flakes of a fine yellow foliaceous Talc; moſt of the other Gritts are compos'd of ſtony particles interſpers'd with Micæ, but this is ſingular, in that it is compos'd of theſe, and only thinly interſpers'd with the harder particles; the flakes are very unequal and irregular in ſize; it feels ſofter than the reſt of theſe ſubſtances between the fingers, and ſhook up in water ſettles but ſlowly, leaving a whitiſh-yellow muddineſs behind.

Examin'd by the Microſcope, it appears a congeries of yellow Talcy particles, very gloſſy, and but moderately tranſparent, thinly interſpers'd with irregular fragments of a whitiſh and reddiſh ſemi-pellucid ſtony matter; the flakes of Talc in this, as alſo in many others of this claſs, have ſomething of the look that Talc has when we have made it paſs the fire.

It makes no efferveſcence with Aqua Fortis.

In the fire it acquires a ſomething paler colour, with an additional brightneſs.

I receiv'd this from Virginia, but it is alſo found in Germany, France, and England; in all which places it has, at one time or other, deluded adventurers with the hopes of a gold mine.

SECT. V. Black and blackiſh GRITTS.

(a) Compos'd of homogene ſtony particles.

1. *Saburra nigerrima, ſplendida, tenuis albo variegata.*
Fine, very hard, black Gritt, variegated with white.

This is the hardeſt, heavieſt, and brighteſt of all the bodies of this claſs; it is very fine, of a remarkable weight, and of a fine jet black, variegated with a few ſpecks of white; all the particles it is compos'd of, are nearly of the ſame ſize, and all very bright and ſparkling; it feels the moſt hard and ſharp of any ſubſtance of this kind between the fingers, and ſhook up in water ſubſides immediately, and leaves no muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of very irregular particles, all of angular figures, ſome whitiſh, and others greeniſh, both very tranſparent, but the greater quantity are of a fine jetty black, abſolutely opake, and having much of a metalline look.

It makes no effervefcence with Aqua Fortis.

It burns to a ſomething paler colour.

I receiv'd it from the coaſt of France, where there is much of it in different places, tho' no where any thing like a ſtratum; it ſeems the diſunited matter of ſome extreamly hard and beautiful ſtone.

(b) Compos'd of ſtony and talcy particles.

1. *Saburra micacea, tenuior, albo-nigreſcens, variegata.*
Fine, variegated, black and white Gritt.

This is a very bright and gay-looking maſs; it is conſiderably fine, but moderately heavy, of a fine bright black and white mottled colour; its conſtituent particles are very bright and ſhining in themſelves, but the whole is render'd much more ſplendid, by a plentiful admixture of fine white Talcy flakes; it feels very hard, harſh, and cutting between the fingers, and ſhook up in water ſubſides very quickly, and leaves not the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of very elegant and beautiful particles, part black and opake, and part colourleſs and pellucid, with all the brightneſs and fine water of the pureſt cryſtal; among theſe are interſpers'd not a few flakes of a fine pellucid white Talc, which, with the reſt, make it a moſt agreeable object.

It makes no effervefcence with Aqua Fortis.

It burns to a very pale reddiſh grey.

I receiv'd it from the ſhores of the Mediterranean, but could not learn the exact place; it appears evidently the diſunited matter of a fine and hard Granite.

2. *Saburra micacea, craſſiſſima, grizeo-nigreſcens variegata.*
Coarſe, variegated, black and grey micaceous Gritt.

This is but a dull colour'd, but a very finely ſpangled maſs; it is very large and coarſe, extreamly heavy, and of a variegated or mottled grey and black; its particles are all much of a ſize, and the greater part of them coarſe and dull, ſome few appear bright, but the glittering of the maſs is owing to a conſiderable quantity of very large and broad flakes of a white gloſſy Talc; it feels very hard and coarſe, but not ſo ſharp as many others of this claſs between the fingers; and ſhook up in water ſubſides immediately, and leaves not the leaſt foulneſs in it.

Examin'd by the Microſcope, it appears compos'd of a multitude of white ſemi-pellucid particles; among theſe are interſpers'd, pretty plentifully, others which are colourleſs and pellucid as cryſtal, and very bright, and among theſe many flakes of a coarſe white Talc, and a multitude of others of a black and almoſt perfectly opake one; both theſe Talcs are of a very coarſe kind, and ſeem not to be ſplit into thin flakes, the fragments in this maſs being all thicker than the Micæ are uſually found, and if examin'd edgeways, ſhewing a texture, tho' fiſſile like the reſt, yet plainly diviſible only into a ſmall number of flakes.

It makes no effervefcence with Aqua Fortis.

It burns to a fair fleſh colour, with black and white ſpots.

I receiv'd this from the ſhores of Wales, where there is much of it in different places; it ſeems very plainly the ſeparated particles of a Granite, but whether this, and the reſt of this claſs are now in their original ſtate, or are only the ſeparated particles of ſtones waſh'd away by the water, is what there muſt be more obſervation made on the ſpot in order to determine; their being all found on the ſea ſhores, ſeems to favour this opinion; but when we conſider the extream hardneſs of the ſtones they muſt have been waſh'd from, it ſeems neceſſary, in regard to many of them, to find a more powerful agent than the motion of water to diſunite them; their figure evidently receding from that of Sands in their particles, might favour their being fragments, but the brightneſs of their ſurfaces in ſome parts, and ruggedneſs in others, ſeems ſtrongly to favour their having been the exact ſuperficies they were originally poſſeſs'd of.

(c) Containing metalline Particles.

1. *Saburra ſcintillans, tenuis, nigro-ferruginea.* *Ferrugineous, black, glittering Gritt.*

This is the black ſhining Sand, uſually employ'd to throw over writing; it is conſiderably fine, of very great weight, and of a duſky ferrugineous black, and is perfectly dull, and deſtitute of brightneſs in itſelf, but render'd extreamly ſparkling by a multitude of black, flat, ſhining particles; its particles are of extreamly different ſhapes, ſizes and figures, but appear moſtly flat; it feels conſiderably harſh and rough between the fingers, and ſhook up in water ſettles immediately, and leaves not the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a very elegant aſſemblage of a number of different particles, ſeveral of which are of unequal ſurfaces, and in ſhape reſembling ſmall Pebbles, theſe are either colourleſs, yellowiſh, or reddiſh; beſide theſe which are conſiderably bright and pellucid, there are a multitude of others which are of very uncertain and irregular figures, and perfectly opake; theſe are fragments of ſtones of various kinds, and a vaſt number of them which are of a duſky and ſomewhat reddiſh hue, are pieces of a very rich iron ore; theſe are the various particles that conſtitute the leſs ſhowy part of the maſs; but among theſe there lie in vaſt abundance, fine flat ſpangles of various ſhapes and ſizes, but all of a moſt bright poliſh; theſe have generally been hitherto eſteem'd flakes of a foliaceous Talc, but are in reality no other than plated fragments of a fine and very rich lead ore; it is wonderful that the Gentlemen who have hitherto eſteem'd theſe pieces of Talc, ſhould not have obſerv'd that they were not pellucid. They are generally conſiderably thick, of an extream brightneſs, as indeed I know no ſubſtance brighter than ſome of the lead ores; and if examin'd on all other ſides as well as on the plated and gloſſy ſurface, will ſoon diſcover themſelves to be the very ſame thing that our common lead ores will break into under a hammer; the iron ore particles in this are ſo rich, as readily to faſten to the Magnet.

It makes no efferveſcence with Aqua Fortis.

It burns to a ſomewhat blacker colour; but without loſing any thing of its brightneſs.

It is found on the ſhores of Italy, and ſome other places; what is commonly us'd in London is from Genoa.

2. *Saburra ſcintillans, nigro fuſca, craſſior.* *Coarſe, glittering, browniſh black Gritt.*

This is a very bright and beautiful Sand, but inferior to the former in all reſpects, tho' compos'd in a great meaſure of the ſame ſort of particles; it is conſiderably coarſe, very remarkably heavy, of a duſky, deep, browniſh black, and entirely dull and deſtitute of ſplendor in itſelf, but ſpangled with ſhining flat particles like the former, tho' much ſmaller and fewer in number; its conſtituent particles ſeem tolerably regular in ſize; it feels very ſharp and cutting between the fingers, and ſhook up in water ſettles immediately, and leaves a little blackneſs in it.

Examin'd by the Microſcope, it appears compos'd of a great variety of particles, all nearly of the ſame ſize, but of very different ſhapes and figures, part of them are fragments of ſtones and part of iron ore, but the greateſt quantity are plain fragments of a diced lead ore; theſe are what give the glittering, but they are leſs bright than thoſe of the former, and have ſmaller ſurfaces, as they are not flat plates like thoſe, but all pieces in ſome degree approaching to cubes, and only bright on one or two of their ſurfaces, ſometimes even on none; the particles of iron ore in this as in the former, adhere freely to the Magnet, but they are much fewer in this than in that.

It makes no efferveſcence with Aqua Fortis.

It burns to a ſomething blacker colour.

It is common on the ſhores in many parts of Wales, where the Gentlemen have it gathered, and uſe it, as we do the Genoeſe, to ſtrew over writing.

3. *Saburra ſcintillans, tenuis, nigro cærulea.*
Fine, blueiſh black, glittering Gritt.

This is a very bright and elegant Gritt; it is moderately fine, very remarkably heavy, of a fine elegant blueiſh-black colour, and great brightneſs; the glittering particles in this not being like thoſe in the two foregoing ſcatter'd among the maſs of the whole, but being in this really the moſt numerous, and in greateſt quantity of any; the conſtituent particles of this are very various and irregular in ſize and figure; it feels conſiderably harſh and rough between the fingers, and ſhook up in water ſettles immediately, without leaving the leaſt muddineſs in it.

Examin'd by the Microſcope, it appears a congeries of various colour'd fragments of Stone and Spar, ſome reddiſh, ſome greeniſh, and ſome blackiſh, mixed among a multitude of particles of various ſizes, ſhapes and figures, but all of a blueiſh black, and of very gloſſy ſurfaces; and moſt of them if nicely examin'd, either plated or approaching to a cubic ſhape; theſe make the body of the maſs, and are evidently no other than fragments of a very fine lead ore, the ſtony particles among theſe are probably broken fragments of Stone and Spar which have lain about the ore in the earth, and the whole is moſt likely to have been waſh'd out of the cliffs by ſtorms, and broken into theſe ſmall pieces by the motion of the water on the ſhores; this contains no iron ore, and conſequently no part of it adheres to the Magnet.

It makes a ſlight efferveſcence with Aqua Fortis, which is probably owing to the ſparry matter contain'd in it.

It burns like the others to a ſomething darker colour, and being richer in lead than the reſt, cakes together into lumps with the common degree of fire us'd on this occaſion.

It is common like the former on the ſhores of Wales.

FOSSILS

NATURALLY and eſſentially compound, not inflammable, nor ſoluble in water, found in detach'd maſſes.

Series the fourth.

Thoſe form'd of a fine pellucid ſubſtance, of great hardneſs, and never foul'd by an admixture of earthy, or any other coarſe matter, but ſuſceptible of elegant tinges from metalline particles.

Of this Series there is only one Claſs.

The bodies compoſing this Claſs are the pellucid Gems.

Theſe are bright elegant and beautiful Foſſils, ever found in ſmall maſſes, extreamly hard, pellucid and of great luſtre, compos'd of a very firm and pure ſubſtance, giving fire with ſteel, not fermenting with Acid Menſtruums, and very difficultly calcinable in the fire.

Of this Claſs there are two Genera.

Genus 1. CHROSTASIMA. *Pellucid Gems, of one ſimple and permanent appearance in all lights.*

Genus 2. CHROASTACES. *Pellucid Gems, of variable colours, as view'd in different lights.*

Compound FOSSILS.

SERIES IV.

CLASS I. GENUS I.

CHROSTASIMA.

Pellucid Gems of one ſimple and permanent appearance in all lights.

SECT. I. Colourleſs.

1. *Adamas.*
The Diamond.

THIS is the moſt valuable, and the hardeſt of all the Gems, and tho' found of different ſhapes, and ſometimes are identally ting'd to ſeveral colours, yet ever carries the ſame diſtinguiſhing characters, and is very evidently in all thoſe ſtates the ſame body.

It is, when pure, perfectly clear and pellucid, as the pureſt water, and is eminently diſtinguiſh'd from all other ſubſtances, by its vivid ſplendor, and the brightneſs of its reflexions. It is extreamly various in ſhape and ſize, being found in the greateſt quantity, very ſmall, and the larger ones extreamly ſeldom met with; the largeſt diamond certainly known ever to have been found, is that in the poſſeſſion of the Great Mogul, it weighs two hundred and ſeventy-nine carrats, and is computed to be worth 779,244 pounds.

If the ſize of the Diamond is very irregular and uncertain, its ſhape is extreamly more ſo; all its varieties of figure, are, however, found no way to affect the internal ſtructure of the body; the Gem being equally bright, equally hard, and equally valuable in all, and theſe differences in ſhape ſeem wholly owing to the more ſlow, or haſty concretion of particles entirely of the ſame kind. The Diamond has certainly one proper and determinate figure, into which it naturally muſt concrete, when in a ſtate of reſt, and impeded by no accident in its formation; and ſo we know have each of the various ſalts, yet a greater degree of fire us'd in the evaporation of the liquor they were ſuſpended in while in ſolution, or many other accidents of which we are able to aſſign the cauſes, and which we can bring on at pleaſure, can prevent thoſe ſalts from cryſtalizing in their proper and determinate form, and make them aſſume very different and irregular ones; what we are able to do by art, it is alſo evident nature has done by accident, in the formation of many of theſe bodies; we find Cryſtal and Spar, which naturally have their own peculiar forms, and regularly angular figures, concreted in many places into ſhapeleſs maſſes, and the firſt frequently into a round and Pebble-like form.

What art can do by the Salts, and nature by Cryſtal, ſurely we can have no room to doubt, but the ſame agent has alſo done by Diamonds, and that in thoſe pretious bodies, as well as in the leſs valuable ones of Cryſtal and Spar, the ſubſtance is the ſame, whether it have concreted more haſtily into leſs regular maſſes, or more ſlowly and leiſurely into its proper and determinate figures; nor is this opinion to be advanc'd merely as a conjecture, or ſupported only by the ſameneſs of the bodies in their ſeveral forms, which yet alone might prove a very weighty argument; but experiment proves it in the one, and a ſtrict analogy leaves no room to doubt it in the others. Spars are perfectly ſoluble in many Acids, but particularly in that drawn from the crude Pyrites; and in the courſe of experiments I have been engag'd in on theſe occaſions, I have many times by diſſolving a ſhapeleſs maſs of Spar, which appeared to be the ſame with ſome of the regularly figur'd ones, only wanting their figures, after evaporation, brought the diſſolv'd Spar to recryſtalize, and it has then form'd itſelf into regularly figur'd bodies, according to the ſpecies it belong'd to, either of the columnar, parallellopiped or rhomboidal kinds. We are not happy enough at preſent to know any ſolvent for the other bodies under conſideration; but if ſuch a Menſtruum ſhou'd ever be diſcovered, there is no doubt but Pebble Cryſtal may be reduc'd by ſolution and recryſtalization to regular hexangular Cryſtal, or to which ever of the other ſpecies it may properly have belong'd to; and the ſhapeleſs Diamonds, to the form of the more regularly figur'd bodies of the ſame Stone.

Having premis'd thus much as to the cauſes of the variation of figure in Diamonds, there is only one farther obſervation neceſſary in order to underſtand their true hiſtory; this is to be drawn alſo from the ſame ſource with the reſt; the cryſtalization of Salts; ſolid bodies which we are able to reduce by art into a fluid, and thence again into a ſolid ſtate, and thereby imitate the operation of nature in the forming the regularly figur'd native Foſſils; this is that beſide the irregular and ſhapeleſs maſſes, into which we are able to reduce the naturally regular bodies of the various ſalts; there is one of them, *viz.* Common alimentary ſalt, which according to the management of heat given in evaporating its ſolution, is, beſide theſe ſhapeleſs maſſes, capable of very unlike, yet all perfectly regular figures, the ſame ſolution affording cubes, pyramids and parallellopipeds.

There can be no reaſonable objection to the origin of the Diamonds having been its concreting out of a ſtate of ſolution in a fluid, and no cenſure of improbability on the opinion of its being ſubject, like other bodies in the ſame ſtate, to aſſume from the power and action of the ſame, or ſimilar agents, the ſame variety of forms; and there may then be allowed, even in the ſame ſpecies of body, two or three regular, yet different figures, and an unlimited variety of irregular ones.

The figure of the Diamond has been a thing ſo little enquir'd into by authors, who have written on theſe ſubjects, that what can be known of it, muſt be learnt from obſervation only; and what appears to me to be the true ſtate of the caſe, from the quantities I have had opportunities of obſerving is that the true figure of the Diamond, is an inequilateral Octohaedron, and that wherever it has concreted, in a perfect manner, and without any interrupting accidents, it has always form'd itſelf into this figure, and often in this its ſeveral ſurfaces are as bright as if poliſh'd by art; but as in common Salt, tho' the natural figure be pyramidal, yet very eaſy accidents can determine it into cubes and parallellopipeds; ſo the Diamond has often in its ſtate of formation been thrown into two other figures, both alſo ſeeming regular ones, the one a priſmatic columnar one, of ſix angles, ſomewhat emulating the figure of Cryſtal; the other an oblong quadrilateral column, with two truncated ends: theſe ſeem the only regular figures of this Gem; but beſide theſe, it is every day found in numberleſs other miſ-ſhapen forms, often roundiſh, emulating the ſhape of Pebbles, but full of ſmall flat planes or faces; frequently oblong, very often flat, and as often tapering, either from one end to the other, or elſe from the middle equally to both ends. Theſe are the figures in which rough diamonds offer themſelves to our view; they are often alſo obſcur'd on their ſurface, by various foulneſſes, and frequently have certain points of an inconceivable hardneſs in different parts of them; and theſe are much dreaded by the Diamond cutters, as requiring great labour to work them down.

The Diamond the moſt readily of all bodies gives fire with ſteel.

It makes no effervеſcence, nor ſuffers any the leaſt change in the moſt powerful Acid Menſtruums.

It bears the force of the ſtrongeſt fires, except the concentrated ſolar Rays, without hurt, and even that infinitely fierceſt of all fires, does it no injury, unleſs directed to its weaker parts. It bears a glaſs-houſe fire for many days, and if taken carefully out, and ſuffer'd to cool by degrees, is found as bright and beautiful as before; but if taken haſtily out, it will ſometimes crack, and even ſplit into two or three pieces.

The ſtructure of the Diamond, is by no means diſcoverable without the aſſiſtance of glaſſes; but examin'd by the Microſcope, it is ſeen to be compos'd of great numbers of parallel plates or tables: Theſe are of the moſt extream thinneſs, and are laid in perfectly regular order on one another; in the flat plain maſſes theſe are merely even horizontal flakes, each covering the whole ſurface of the maſs, as in the foliaceous Talcs; and in the angular figur'd ones they are diſpos'd in the manner of the Marchaſites and Cryſtals.

It is a common thing for Diamonds to be too thick or deep for the extent of their ſurface, as there is a certain proportion of depth beyond which the Gem ſhou'd not be allowed; in this caſe two Diamonds are often made by the regularly dividing one. This when the maſs is of an angular figure, is done by cutting it thro' with a wire wetted with oil, and covered with diamond powder; but, in the flat or more common maſſes, is done much more expeditiouſly by finding the grain of the Stone, as it is call'd, that is, the diſpoſition of the plates, and introducing the point of a fine flat chiſſel between them; and when this is properly done, it will ſplit as evenly as a maſs of Muſcovy Talc, and give two Diamonds or more, if the thickneſs will allow it of the ſame breadth of ſurface with the original one; nor is this the only uſe of the ſplitting, ſince when a Diamond has a flaw or blemiſh within it, which greatly debaſes its value, the plates may be ſeparated at a proper depth, and the flaw removed; in which caſe, the thinner cruſt ſtruck off is of value in proportion to its ſize, and the remainder being now freed from its flaw, is of much more value than it was at firſt. It is to this tabulated ſtructure of the Diamond alſo, that the force of the concentrated ſolar fire is ſo very different on different parts of it; for when expos'd to the focus of moſt powerful burning glaſſes, with its plain face to the focus, it bears it long unalter'd; but when the ſides of the Stone are turn'd to it, and it has the commiſſures of the ſeveral plates to act on, it immediately ſplits it into the inconceivably thin Laminæ, of which it is compos'd, and ſoon after melts them into a kind of glaſs, which has nothing of the ſplendor or luſtre of the Diamond.

The places whence we have Diamonds are the Eaſt Indies and the Braſils; they are found in the Eaſt Indies, in the iſland of Borneo, and in the kingdoms of Viſapour, Golconda and Bengal; and in all theſe ſeveral places, the Diamonds, tho' uſually found clear and colourleſs, yet are at times met with ting'd to the colours of the other Gems and that by the ſame means, the mixture of ſome metalline particles. They are not unfrequently found yellowiſh, blueiſh and reddiſh; but more rarely greeniſh. In all theſe ſtates, however, they are extremely different from the other Gems of thoſe colours, as they are infinitely of greater luſtre, and have all the vivid reflexions of the Diamond, and their tinges are uſually very ſlight.

As to what the antients have left us concerning the Diamond, Pliny has ſo unhappily perplex'd the cauſe, by too careleſly tranſlating, and probably miſunderſtanding the authors from whom he has taken his accounts, and which are now loſt; that it is not eaſy from his writings, to form any conjecture as to what they thought of it; and many have ſuppos'd they did not know what we call the Diamond at all: This, however, ſeems too haſty a conjecture. Theophraſtus mentions but one kind of Diamond, which, he ſays, bore the utmoſt force of fire unhurt; and there is no reaſon to doubt but that this was the Gem we ſtill know by that name: between the times of Theophraſtus and Pliny, though that interval was not ſo very great, there ſeems to have crept a vaſt deal of error and confuſion into the world.

Every thing that was hard and impenetrable, got the name of Adamantine; the Baſaltes was call'd adamantine marble; the poets have call'd Pluto's, an adamantine breaſt; and we hear of adamantine chains and adamantine pillars in the courts below: nay, Heſiod has given a man an adamantine ſoul. Hence the word became univerſally apply'd to all hard or unconquerable ſubſtances; and the ſpecks of native gold, call'd adamantine, becauſe they were not to be powder'd with its ore, are very judiciouſly conjectur'd by the excellent Salmaſius to be one of Pliny's Diamonds: we have generally alſo the word Anancites ἀναγκίτης given us as a ſynonimous name of the Diamond; and hence no ſmall errors may ariſe, for the antients never really did call the Diamond by that name, but call'd a very different Foſſil, the Galactites, an indurated clay much reſembling the French chalk, by the name ἀδάμας ἀναγκίτης, from its ſuppos'd virtues of charming the gods to liſten to human prayers. This we have plainly related by Orpheus,

Τόν ῥα παλαιγενέες μὲν ἀναγκίτιν ἀδάμαντα.
Κλεῖον ὅτι γάμπτει μακάρων νόον.

Ἄλλοι δε ἐσκήψαντο γαλακτίδα φέρτερον εἶναι,
Κικλήσκειν πέτρην, ὅθι τοι τρίψαντι γάλακτος,
Ἐκπροέει λευκοῖο πανείκελος ἔνδοθεν ἰχὼρ.

From miſunderſtandings of what different authors had ſaid of many very different bodies, to which they had metaphorically given the name adamantine, on account of ſome of their qualities approaching to that of the Diamond, it is no wonder that ſo careleſs a writer, as we cannot but acknowledge Pliny to be, ſhould have err'd into an opinion of their being ſeveral ſpecies of Diamonds; but it is too raſh a cenſure, becauſe he has ſaid a great deal too much to allow him nothing; nor can I be of the opinion, that becauſe he has deſcribed ſome things under the name of Diamonds, which were not ſo, that therefore the true Diamond, or Stone we call by that name, was not known in his time; for, notwithſtanding that many great men have been of this opinion, and that his editor father, Harduin, ſubſcribes to the opinion of Aldrovand, an author not much more delicate in his collections than Pliny himſelf, and who like that author has given us generally every thing good and bad that has been ſaid on his ſubject, and ſays in his notes, *Genera adamantum a Plinio ceteriſque veterum propoſita ætati huic noſtræ ignota cenſemus cum Aldrovando.* Yet I cannot but obſerve, that the Indian Diamond of Pliny muſt appear to every judicious naturaliſt, to be the very Stone now known by that name, and indeed much better deſcribed than moſt of Pliny's Foſſils are; and that his Arabian one is only a variety of this; his words are, *Indici non in auro naſcentis ſed quadam cryſtalli cognatione, ſiquidem & colore tranſlucido non differt & laterum ſexangulo lævore turbinatus in mucronem; aut duabus contrariis partibus ut ſi duo turbines latiſſimis ſuis partibus jungantur, magnitudine vero avellanæ nuclei, ſimilis eſt huic quidem arabicus minor tantum ſimiliter naſcens: ceteris pallor argenti in auro natales, &c.* I have here given the text as it ſtands in Harduin's edition, and preſume the reader cannot but take notice, how carefully the author has diſtinguiſh'd theſe from the other ſeveral ſubſtances he improperly calls Diamonds; and when we conſider the ſhape, ſize, and other characters he has allotted this Indian kind, he muſt have ſeen very few rough Diamonds of our time, who cannot plainly diſcover that Pliny is here very well deſcribing the ſame Stone.

Sect. II. Red.

1. *Carbunculus.*
The Carbuncle.

A very elegant Gem, whoſe colour is a deep red, with an admixture of ſcarlet.

This is a very beautiful Gem, known among the antients by the name Anthrax ανθραξ, the proper ſignification of which is a lighted piece of charcoal. Our jewellers, among whom it is very rare, know it by no peculiar name; and not only now, but for many ages back, this has been the caſe; and while the genuine Gem was often ſeen, it was yet generally thought no longer to exiſt, and this merely from an error: Its name importing the reſemblance of a burning charcoal, the world in general grew into an opinion of its having the properties of a burning coal, particularly that of ſhining in the dark; and as no Gem was known which had that ſtrange quality, they took it for granted, that the Gem which they ſuppos'd deſcrib'd by the antients as poſſeſs'd of it, was loſt. Nay, the fertile imaginations of ſome travellers have gone ſo far, as to pretend that a Gem with this property is yet to be ſeen in ſome places, and have given a thouſand abſurd relations about it, too ridiculous to grate the ear of the Naturaliſt with repeating.

To all this it is only to be anſwer'd, that the whole opinion was an abſurd error, and that the antients never attributed any ſuch quality to the Carbuncle; that the whole reaſon of their giving the name Anthrax to the Gem was, that it was of itſelf of a very deep and ſtrong red; but when held up againſt the ſun, or when ſet upon a bright pale foil, it was exactly of that ſort of red colour to be ſeen in burning charcoal; to be perfectly aſſur'd of this, we need only turn to Theophraſtus, whoſe account of it is this, that it was a Gem not to be injur'd by fire, and that it was of ſuch a kind of red, that when held againſt the ſun, it reſembled that of a burning coal. His words are, ἄλλο δὲ τι γενός ἐστὶ λίθων ἄκαυστον ὅλως ἄνθραξ καλούμενος, ἐρυθρὸν μὲν τῷ χρώματι, πρὸς δὲ τον ἥλιον τιθέμενον ἄνθρακος καιομένου ποεῖ χρόαν. This is the ſpecies call'd by others of the antients the Garamantine, or Carthaginian Carbuncle, and has been ſuppos'd by moſt of the judges of theſe things to be the ſame with the true garnet of the moderns; but this I find, on comparing the Stones, to be an erroneous opinion, the difference in the figure, and even in the colour of theſe Gems, being eſſential.

The Carbuncle is uſually found pure and faultleſs, and is of the ſame degree of hardneſs with the Sapphire, which is ſecond only to the Diamond; it is ever found naturally of an angular figure, ſmaller at one end than the other, and at that ſmall end tapering to a pointed pyramid, compos'd of the ſame number of planes with the column, which is ſix, and thoſe ever very unequal. It is found adhering by its baſe to a heavy and hard ferrugineous Stone of the emery kind, and is always more finely colour'd toward the point than at the baſe of the column: its uſual ſize is near a quarter of an inch in length, and two thirds of that in diameter in its thickeſt part. Its colour is a very beautiful, but very deep red, reſembling that of a ripe mulberry, and where paleſt, going off into a ſtrong ſcarlet, not into the purpliſh or violet tinge of the garnet; but when held up againſt the ſun, it loſes its deep tinge, and becomes exactly of the colour of a burning charcoal, ſo that the propriety of the name the antients gave it immediately ſtrikes one on making this trial. It bears the trial by fire unalter'd, not parting with its colour by it, nor even becoming at all the paler for it. This has been very diligently try'd by ſome of our jewellers, who diſguſted by its too deep colour, have endeavoured the rendering it more vivid and ſtriking to the eye, by diveſting it of a part of it; but always without ſucceſs. It is found only in the Eaſt Indies, ſo far as is yet known, and there but very rarely.

The diſtinctions between the red Gems are very nice, and their names in ſome degree arbitrary; many authors have confounded the Carbuncle with the Ruby, and determin'd with Garcias, that every Ruby which exceeded twenty-four carrats was properly a Carbuncle. This Stone, however, is from all trials evidently the Carbuncle of the antients, and is eſſentially different from the Ruby, in its wanting the purpliſh tinge, into which the colour of that Gem goes off; this going off into a true ſcarlet, and for that reaſon giving the true appearance of a burning charcoal in the ſun, which neither the Ruby, Garnet, nor any other red Gem can do, which has the blue or purple caſt.

After the days of Theophraſtus, the writers became leſs accurate in their diſtinctions of the Gem; and though that author allow'd only one ſpecies of Carbuncle or Anthrax, by the time of Pliny, that name was made to comprehend all the red Gems, the various ſpecies of the Ruby, Garnet, Amethyſt, Almandine, and Hyacinth.

2. *Rubinus.*
The Ruby.

A beautiful Gem, whoſe colour is red, with an admixture of purple.

This is one of the red Gems confounded by Pliny, under the common name Carbuncle; and is in its moſt perfect and beſt colour'd ſtate, a Gem of prodigious beauty and extream value; it is often found perfectly pure and free from blemiſhes or foulneſs, but much more frequently it is debas'd greatly in its value by them, eſpecially in the larger ſpecimens. It is of very great hardneſs, equal to that of the Sapphire, and ſecond only to the Diamond. It is various in ſize, but is leſs ſubject to variations in its ſhape than moſt of the other Gems. It is uſually found very ſmall; its moſt common ſize being that of the head of the larger ſort of pins; and when of this ſize it is very cheap; but it is found of four, eight and ten carats, and ſometimes, though that very rarely, up to twenty, thirty, or forty; nay, we have accounts of ſome of more than a hundred. It is never found of an angular or cryſtalliform ſhape, but always of a pebble-like figure, often roundiſh, ſometimes oblong, and much larger at one end than the other, and in ſome ſort reſembling a pear, and uſually is naturally flatted on one ſide: it is commonly ſo naturally bright and pure on the ſurface as to need no poliſhing; and where its figure will admit of its being ſet without cutting, is often worn in its rough ſtate, and with no other than its native poliſh. Its colour is red, in very different degrees from the deepeſt Garnet colour, to that of the paleſt red Diamond, but ever with more or leſs of an admixture of a purpliſh tinge. This is very plainly diſtinguiſh'd in the deeper colour'd ſpecimens, but in the pale ones is gradually leſs and leſs to be diſtinguiſh'd.

Theſe are the diſtinguiſhing characters of the Ruby, and by theſe it is eaſily known from the Garnet, Carbuncle, and other red Gems. Our jewellers are very nice, though not perfectly determinate in their diſtinctions, knowing this Gem in its different degrees of colour under three different names, the firſt is ſimply the Ruby, which is what they give it in its deepeſt colour'd and moſt perfect ſtate.

The ſecond is the Spinel Ruby; under this name they know thoſe Rubies which are of a ſomewhat leſs deep, and greatly leſs bright colour than what they call the true Ruby.

The third is the Balaſs Ruby, a name deriv'd from Balakeia, the country where the paler Rubies are principally found; under this name they expreſs a pale, yet very bright Ruby, with a leſs admixture of the purple tinge than in the deeper colour'd one, and ſomething reſembling the colour of the damaſk roſe, but for its faint admixture of purple: this is of conſiderable value, but leſs than the deeper Ruby.

Beſides theſe, they alſo know two other Stones under the ſame general name of Rubies, calling them the Rock Ruby, and the Rubacelle; but theſe are not of the Ruby kind; the firſt being a very beautiful ſpecies of Garnet, having an admixture of blue with its red, and the other of the Hyacinth, having a faint admixture of yellow.

The ſmaller Rubies are always pale and ſhew very little of the purpliſh caſt.

We have the true Ruby only from the Eaſt-Indies, and the principal mines of it there are in the kingdom of Pegu, and in the iſland of Ceylon; in the firſt of theſe places they are found in great abundance in the mountain Capelan; and in the latter, are met with both among the ſtrata of the mountains, and in the beds of rivers.

We have in Europe Cryſtals tinged to the colour of the Ruby, but they have nothing of its luſtre or hardneſs; and in the Eaſt Indies the true Rubies are often found almoſt wholly colourleſs, and frequently variegated with ſpecks of blue, but theſe are reckoned of little value; doubtleſs alſo, they are like the other Gems found ſometimes wholly deſtitute of colour, but in this ſtate, as the hardneſs of the Stone is the only character by which it is known to be of the Gem Claſs, both this and the other colourleſs Gems are confounded together under the name of the white Sapphire.

3. *Granatus.*
The Garnet.

A very beautiful Gem, whoſe colour is red, with an admixture of blueiſh.

This is a Gem very ſubject to faults and blemiſhes, and of very different degrees of colour in its different ſpecimens, but when pure and well coloured is little inferior in appearance to the oriental Ruby; it is of a middle degree of hardneſs between the Sapphire and common Cryſtal, and is found of various ſizes, from that of a large pins head to an inch in diameter, but ſuch large ones are very rare; the larger that are uſually found not exceeding a fifth of an inch in diameter; it is almoſt always found of an oblong or irregularly rounded and Pebble like figure, and never in angular columns; its ſurfaces are not ſo ſmooth or polite as thoſe of the Ruby, and its colour is ever a ſtrong red, with a plain admixture of blueiſh; its degree of colour is very different in the different ſpecimens, and it always wants much of the brightneſs of the Ruby, as well in its poliſh'd as in its native rough ſtate.

Theſe are the determinate characters by which the Garnet is to be known from all the other red Gems; but among our lapidaries and jewellers genuine Garnets according to their different degrees of colour, are known by ſeveral different names.

1. The Garnet, ſimply ſo called, this is the fineſt and moſt valuable kind; it is of a very deep blood red with a faint admixture of blue.

2. The *Rock-Ruby.* This is the name they very improperly give to the Garnet, when it is of a very ſtrong but not deep red, and has a fairer caſt of the blue; this is a very beautiful Gem.

3. The *Sorane,* or as they ſpeak it, the *Serain Garnet.* This is the name by which they call thoſe Garnets, which are of a yet brighter red, approaching to the colour of native Cinnabar, with a faint blue tinge.

4. The *Almandine.* This is the name given to the Garnet, when of the ſame admixture of tinge with the Rock Ruby, but only a little paler.

Theſe are the names by which the more expert among the jewellers diſtinguiſh the various appearances of the Garnet, and which, tho' to the Naturaliſts they are but varieties, are yet to them as diſtinct ſpecies of Gems, ſince they are of their ſeveral different values; but among the leſs judicious of theſe artificers, the names are ſtrangely confounded with one another, and even with other Stones; the bluer Amethyſts being by ſome of them call'd Rock Rubies, and the deeper Hyacinths, Sorane Garnets.

The Antients, tho' they have not diſtinguiſh'd this Gem by any peculiar name, yet ſeem to have been well acquainted with it, mentioning its ſeveral appearances as to its different degrees of colour as ſo many ſpecies of their Carbuncle; the name by which they called all the red Gems, and their Træzenius, Sandaſter and Sandareſus ſeem to have been only varieties of it.

Some Authors of very diſtinguiſhing judgments have taken the deeper Garnet to be the very ſpecies of Gem known by the name Carbuncle among the Antients; and I was long of the ſame opinion, till meeting with the true Carbuncle, it appeared very plainly, on the compariſon of their appearance on receiving the ſun's beams, that the Garnet whoſe colour goes off into a blue, could never give ſo true a fire colour in the ſun, as the true Carbuncle, whoſe deep red went off into a fine ſcarlet.

Our jewellers very properly diſtinguiſh their Garnets into the oriental and occidental kinds, as they are found in Europe as well as the Eaſt-Indies; the oriental are principally brought from Calicut, Cananor and Cambay; the European ones are common in Italy, Hungary and Bohemia; the oriental ones are found looſe among the earth of mountains, or ſands of rivers; but the European are moſt frequently found immers'd in vaſt quantities in a browniſh black ſoft Stone, interſpers'd with ſpangles of a foliaceous Talc.

4. *Hyacinthus.*
The Hyacinth.

A Gem whoſe colour is red, with an admixture of yellow.

This is a very different Gem from that known by the Antients under the name of the Hyacinth, which was a variety of the Amethyſt, with a large admixture of a deep blue: a Stone ſeldom ſeen among us; the Antients knowing this Gem, called by us the Hyacinth, under the name of Lapis Lyncurius.

This is a bold conjecture, which I have ventured to aſſert in my notes of Theophraſtus, as it is founded on the account that Author gives us of this Stone, and the learned world have received it favourably; nor am I ſingle in the opinion, ſince Epiphanius and ſome others have made the ſame conjecture, tho' they have not examin'd the point with ſufficient accuracy and diligence.

The common opinions of Authors have been, that the Lapis Lyncurius of the Antients was what we call the Belemnites, or elſe, that it was Amber.

Theophraſtus's account of it is, that it was of a very ſolid texture, that it was us'd to engrave ſeals on, that it had an attractive power like that of Amber, and that it was pellucid and of a flame colour; his words are, *τὸ λυγκύρων ϗ γὰρ ἐκ τȣ́τȣ γλύφεται τά σφραγίδια. ἔϛί ϗ ϛερεωτάτη, ϗ ἕλκει ὥσπερ τὸ ἤλεκτρον, ἔτι δὲ διαφανή τὲ σφόδρα ϗ πυῤῥά.* I need not obſerve, that this is of all the Antients the Author moſt to be depended upon in regard to Foſſils, and it is plain from his words, that the Lapis Lyncurius could not be the Belemnites, becauſe that Foſſil is neither hard not at all fit to cut ſeals on, being friable and of a ſtriated texture; nor could it be the Amber, becauſe this Author could not have compar'd a body to itſelf; it is evident therefore, that a new Foſſil is to be looked for to anſwer the name of the Lapis Lyncurius of the Antients; and it is alſo plain, that the Gem we now call the Hyacinth, is not deſcribed by any other name among the Antients, tho' we cannot believe but that a Gem always ſo common muſt have been known to them; and 'tis equally plain that our Hyacinth, and no other known Gem anſwers to all the characters they have given us of Lapis Lyncurius; and ſurely it is reaſonable hence to conclude, that this is the Gem known to them by that name; Pliny's account alſo confirms this opinion; and the Deſcription of the Lyncurius by Theophraſtus, tho' it ſeems very plainly taken from another Author, he ſays, it was a Gem reſembling the Carbuncle, but of a flame colour; words which could never have been ſpoken of the Belemnites, but which very exactly and happily expreſs our Hyacinth. The Antients had all an idle opinion, that this Stone was formed of the indurated urine of the Lynx: Pliny's account of it is this; *Lyncum humor, ita redditus, ubi gignuntur, glaciatur, areſcitque in Gemmas Carbunculis ſimiles, & igneo colore fulgentes, Lyncurium vocatas*; and this cannot but be allowed to be a good deſcription of the Gem we call the Hyacinth.

It is a leſs ſhewy Gem than any other of the red ones, but is not without its beauty, which in the fineſt ſpecimens is very great tho' not gaudy; and it is as ſeldom found blemiſh'd or faulty as almoſt any other Gem; it is of various ſizes, but is ſeldom found ſmaller than a ſeed of hemp, or larger than a nutmeg; we have had accounts indeed of ſome of a much larger ſize, but they ſeem not much to be depended upon. It is not leſs irregular in ſhape than in ſize, being found ſometimes in a regularly hexangular column, terminated by an hexangular pyramid, and in all reſpects, except colour and hardneſs, reſembling Cryſtal; and at others in form of a ſmall, roundiſh, or oblong, and generally ſomewhat flatted Pebble; it makes much the beſt external appearance in the cryſtalliform ſtate, but is ever harder and of a finer water in the Pebble ſhap'd maſſes; it is ſomewhat leſs hard than the Ruby or Sapphire, but greatly harder than Cryſtal; it is found of various degrees of deepneſs or paleneſs, but its colour is always a deadiſh red, with a conſiderable admixture of yellow, ſometimes indeed ſo much as for the laſt to ſeem the predominant colour. It is ſometimes ſo deep as to approach to blackneſs, unleſs held up againſt the light, and at others is almoſt, and probably often wholly colourleſs; though in that ſtate not diſtinguiſhable from the other Gems in the ſame condition; but its moſt uſual colour is that ſort of mixt red and yellow, which we know by the name of flame colour.

Theſe are the characters by which this is diſtinguiſh'd from all the other Gems; and our jewellers and lapidaries, according to its different degrees of colour, diſtinguiſh it into three kinds, which they call by its own name, and a fourth uſually, but improperly eſteem'd a ſpecies of Ruby by authors.

The firſt of theſe is the *Hyacintha la Bella.* This is the name they give to the Gem in its moſt perfect and beautiful ſtate, when it is of a pure and bright flame colour, ſeemingly made of a mixture of a cinnabarine red, with a moderate proportion of a fine amber yellow.

The ſecond is the *Saffron Hyacinth.* This is the name they give this Gem when it has more of the red and that of a deeper and duſkier colour, and is tinged with an admixture of a dead and browniſh yellow.

The third is, the Amber Hyacinth, this is the name they give thoſe Hyacinths which are ting'd with a fainter red in a ſmall proportion, and a very large ſhare of a dead whitiſh yellow.

And finally, the fourth is, the *Rubacelle*, a name given to the Hyacinth, when of a very deep and ſtrong red, blended with a duſky and very deep yellow. The ſtrong colour of the red in this Stone, has made it generally have a place among the Rubies in the accounts of authors; but a compariſon of it with the two Gems will eaſily ſhew, that it belongs not to the Ruby, but to the Hyacinth kind.

The firſt of theſe are the finer Hyacinths, and are of conſiderable value, they are brought to us both from the Eaſt and Weſt Indies. The Rubacelle is only found in the Eaſt Indies, but is of very little value, and the other two varieties are common both to the Eaſt and Weſt Indies, and to Sileſia, Bohemia, and ſeveral other parts of Europe; theſe are indeed ſometimes brought over among the finer kind from the Eaſt Indies, as is alſo the Hyacintha la Bella, ſometimes found in Bohemia, tho' poor in compariſon of the oriental; it is no wonder indeed, that they ſhou'd all be found equally in both places, being all only the varieties of the ſame Gem, but the oriental are in general infinitely the finer and better colour'd.

SECT. III. Purple.

Amethyſtus.
The Amethyſt.

The Amethyſt of the Antients was the ſame with the Stone we now know by that name, and the Gem call'd by them the Hyacinth, was only an accidental variety of this Stone. They accounted beſide that five other ſpecies as they call'd them of the Amethyſt, all which were only varieties in the degree of colour, and all which we alſo have at preſent, tho' not known among our jewellers, under any particular names; indeed there might be numberleſs names given to the different ſpecies of this Gem, if they were to be taken from all its different degrees of colour; it having ſometimes a bluer, ſometimes a redder purple, and varying in the degree thro' all the intermediate changes between the deep colour of the ripe purple grape, and a perfect whiteneſs.

It is inferior to ſcarce any of the Gems in the beauty of its colour, and in its pureſt ſtate is of the ſame hardneſs, and at leaſt of equal value with the Ruby and Sapphire; it is found of various ſizes, from the bigneſs of a ſmall vetch, to an inch and a half in diameter, and often to much more than that in length. It is very various in ſhape as the Diamond, and ſome other of the Gems; it is not unfrequently found in a roundiſh or pebble-like form, ſometimes a little longiſh, and often thicker at one end than the other, and in this ſtate in ſome ſort reſembling a pear: it is ſometimes equally rounded every way, but more frequently it is flatted on that which has originally been its bottom ſurface, and often has ſeveral ſmall and very bright flat faces in different parts; tho' this is no unuſual form to meet with it in, its more common appearance, however, is in a cryſtalliform figure, being found adhering by its baſe to ſtony matter, and either cruſting over the perpendicular fiſſures in rocks of ferrugineous Stones, or coating the inſides of large and hollow ferrugineous nodules of the Geodes kind, and reſembling the hollow flints which we every day ſee in England, coated within with common ſmall and pellucid Cryſtals; in theſe it always aſſumes either the form of a ſhort and thick column, compos'd of four planes, and terminated by a flat and ſhort pyramid, of the ſame number of ſides, or elſe the very figure of our common hexangular Cryſtal, being a longer and thinner hexangular column, terminated by a long hexangular pyramid; and often that of a long pyramid, without a column; in the laſt of theſe ſtates it makes the gayeſt figure, but in the pebble ſhape it is always the hardeſt and moſt valuable.

Its colour is a purple in various degrees, and with various ſhades of colouring; it ſeems compos'd of a ſtrong blue and a deep red, and as there is an over-proportion of either of theſe tinges, it affords a different ſort of purple, ſometimes approaching to violet colour, ſometimes even fading to a ſort of pale roſe colour; it is alſo not unfrequently wholly colourleſs; and whether naturally found ſo, or made ſo by art, by diveſting it of its colour by means of fire, it ſo well imitates the Diamond, that its want of the due hardneſs ſeems almoſt the only criterion to diſtinguiſh it by. We have no peculiar names for its different ſhades of colour, as is the cuſtom in regard to many of the Gems, but the Antients diſtinguiſh'd thoſe ſpecimens of it, in which the blue in the compoſition of its colour much over balanc'd the red, by the name of the Hyacinth, from the reſemblance in colour to the flower of that name. The tips of the angular Amethyſts are often only colour'd, the bottom of the ſprigs remaining white.

It is found in the Eaſt and Weſt Indies, and in ſeveral parts of Europe; ſome of the finer ſpecimens of the Eaſt Indies, both of the columnar and pebble kind, but principally of the latter, are ſo hard and bright, as to equal any of the colour'd Gems in value; but theſe are very few in number, and are very rare, moſt of thoſe found there being but little harder than common Cryſtal; and all the European ones being of the ſame degree of hardneſs with theſe laſt, whence the Amethyſt in general is of much leſs value than moſt of the other Gems, tho' here and there a ſpecimen of it is finer: the oriental are found in the kingdoms of Calicut and Biſnagar; the occidental are very common in many parts of Europe; Germany, Sileſia and Bohemia abound with them, and they are not uncommon in Spain and Italy; the Pyrenæans and mountains of Auvergne afford very fine ones, and the mountain St. Sigimnont in Catalonia is dug in many places for them, where they find the fineſt, lodg'd in the perpendicular fiſſures of the rock among a reddiſh ferrugineous earth.

SECT. IV. Blue.

Sapphirus.
The Sapphire.

The Gem we know by this name is extreamly different from the Stone, call'd Sapphire by the Antients, which was properly no pellucid Gem, but a ſemi-opake Stone, of a very deep blue vein'd with white, and ſpotted with ſmall gold colour'd ſpangles in form of Stars, and was only a more beautiful kind of the Lapis Lazuli, which they call'd the Cyanus: The deſcriptions of all the authors of antiquity, who have written of what they call the Sapphire, plainly evince this, as I have ſhewn at large in another place *; and hence authors of later date have haſtily concluded, that our Sapphire was unknown to them; but this ſeems a very improbable conjecture, and a ſtrict enquiry into their writings will ſhew, that they have very well deſcrib'd it under the name of Beryllus Aeroides, or the ſky blue Beryl; and as it had among them no generical name, it cou'd not well have been better nam'd than thus, as the Beryl is of all Gems that which it moſt approaches to the nature of, and its colour is evidently in its moſt uſual ſtate, a fine ſky blue.

It is in its fineſt ſtate an extreamly beautiful and valuable Gem, ſecond only to the Diamond in luſtre, hardneſs and price. It is met with of various ſizes, but ſeldom ſo very ſmall as ſome of the other Gems, and has been found up to three quarters of an inch in diameter; its more uſual ſtandard, however, is between a tenth and a ſixth of an inch. It is various in its figure, being uſually found in the Pebble, but ſometimes in the Cryſtal form; its moſt common appearance is in ſmall irregularly rounded or oblong, flattiſh Stones, cover'd with no cruſt, and looking of a bright blue, but without the luſtre and fine poliſh of the native Ruby; but it is ſometimes found in beautiful hexangular Cryſtals, terminated by hexangular pyramids, and throughout of a fine blue, and of a very delicate poliſh. Sometimes alſo theſe are only ting'd at their points, and ſometimes among cluſters of theſe ſome are perfectly colourleſs.

The proper colour of the Gem is a pure blue; in the fineſt ſpecimens it is of the true deep ſky blue, and in others varies into paleneſs in ſhades of all degrees between that and a pure Cryſtal brightneſs and water, without the leaſt tinge of colour, but with a luſtre much ſuperior to Cryſtal, and more than any other Stone approaching to the nature of the Diamond; and in ſome it has a duſky whiteneſs like milk, which might be ſuppos'd owing to an admixture of a fine white earthy matter, but that we find different mixtures of pellucid liquors, ſolutions of copper, and of different ſalts, are capable of producing the very ſame colour; it ſeems very certain, that this Gem owes its beautiful blue to copper, and the ſame metal being found capable of giving this milky look with the caſt of blue, we find the world has been perfectly right in its general opinion, of accounting this whitiſh blue, or milky looking Stone, a true Sapphire. The pebble Sapphires are always finer than the cryſtalliform ones; and moſt of the fine colourleſs Sapphires, which our jewellers very improperly call white Sapphires, as they have not the leaſt tinge of whiteneſs in them, are of this kind. It is of very different degrees of hardneſs and brightneſs in different parts of the world, and accordingly of very different value.

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* *Notes on Theophraſtus.*

The antients us'd to diſtinguiſh it, as they did indeed all other Stones, into the male and female, according to its deeper or paler colour; and our jewellers, according to their cuſtom of dividing the Gems into ſeveral kinds, according to their different accidents of purity, colour, *&c.* make four kinds of Sapphire.

1. The firſt is the blue oriental Sapphire: this is the name they give the Sapphire, when in its utmoſt perfection, as hard as the Ruby, and of a fine ſky blue.

2. The white Sapphire: this is the name they give the Sapphire when wholly colourleſs, and reſembling a Diamond; but this, as I before obſerv'd, is a very improper name, as the Gem has not the leaſt caſt of white in this ſtate, but is perfectly pellucid and colourleſs as the cleareſt water; and there is another kind, as they diſtinguiſh it, which is truly white.

3. The *water Sapphire.* This is alſo a very bad name, not at all expreſſing what they mean by it; for by this name they call all the ſofter and paler blue Sapphires found in Europe.

4. The *milk Sapphire.* This is the name they give to the Sapphires which have a white milky caſt with a ſlight tinge of blue among it.

The Sapphire will perfectly loſe its colour in the fire, and the deepeſt blue one come out wholly colourleſs, and not to be diſtinguiſh'd from the naturally colourleſs, or as it is call'd the white Sapphire; and one or other of theſe is ſometimes made by the help of a quickſilver foil, to paſs for a Diamond.

The fineſt Sapphires in the world are brought from the kingdom of Pegu in the Eaſt-Indies, where ſome are found perfectly colourleſs, and others of all ſhades of blue up to the deepeſt violet colour; but never with the leaſt tinge of purple or any other colour, but perfect blue; theſe are all found in the pebble form. We have very fine Sapphires alſo partly pebble, partly cryſtal ſhap'd, from Biſnagar, Conanor, Calicut, and the iſland of Ceylon; theſe alſo are of all ſhades of colours, and in Ceylon there are ſometimes found a ſort of baſtard Gems of a mixt nature between the Sapphire and Ruby. The occidental are from Sileſia, Bohemia, and many parts of Europe, and are often very beautiful Stones, but greatly inferior both in luſtre and hardneſs to the oriental.

SECT. V. Sea-green, or of a blueiſh-green.

Beryllus. Gemmariis aqua marina.
The Beryll; call'd by our jewellers from its colour the Aqua marine.

This Gem, which the more accurate writers now call the Beryll, and which our jewellers have learn'd of the Italians to call the Aqua marine, is very plainly the ſame Stone, known by the antients under the ſame name of Beryllus; but the account Pliny gives of it ſhews, that they took in ſeveral other Gems, when of pale or diluted colours under the ſame denomination. The later writers have more accurately kept up to the character of the Gem, and admitted no other ſpecies under its name; but our lapidaries are more than even with the antients, for they call by this name not only a peculiar kind of Cryſtal deſcrib'd among thoſe bodies, but every Stone of a very pale colour, and of a cryſtalline brightneſs goes with them under the ſame title, while the genuine Gem is entirely robb'd of it, and call'd univerſally among them the Aqua marine.

It is, when perfect and fine, a very beautiful Gem, yet is at preſent of no great price. It is found of various ſizes, and in very different ſhapes; but ſeems never to be met with very ſmall, the twelfth of an inch in diameter, being the ſmalleſt uſually ſeen; and about a quarter, or a third of an inch, or a little more the length of the largeſt commonly met with, though there are much larger. It is ſometimes found in form of a ſmall and very irregularly ſhap'd Pebble, ſomewhat approaching to a rounded or oblong figure, but full of ſmall flat faces very irregularly diſpos'd; its moſt uſual appearance, however, is in the Cryſtal form, being found in hexangular columns, terminated by hexangular pyramids; theſe uſually ſtand in cluſters of twenty or more together on the rugged prominences of rocks in the cracks and fiſſures of the ſtrata. It is ever of a tolerably bright and naturally poliſh'd ſurface, and is of a mixt colour of blue and green, making exactly what we call a ſea-green, or ſea water colour. It has this in all the different ſhades, from a very deep and duſky hue to the paleneſs of water, but never has the leaſt tinge of any other colour. Thoſe which are deſcrib'd by authors under the name of Chryſoberylli, as having a mixture of yellow in their tinge, are properly another Gem, as will be ſeen hereafter, they having not the leaſt tinge of blue, or any reſemblance of the ſea water colour, nor anſwering to the other characters of this Gem.

The Beryll in its fineſt ſtate approaches to the hardneſs of the Garnet, but it is often much ſofter, and is conſequently of the leſs value; there is however a common error, which gives our jewellers an idea of this and ſome other of the Gems being much ſofter than they really are, which is the miſtaking the common ting'd Cryſtals frequent in mines, and call'd by authors Pſeudoberyllus, *&c.* for the genuine Gems. It is eaſy to conceive that theſe can be no harder, and naturally enough they may be ſuſpected not to be ſo hard as the common Cryſtal in its colourleſs ſtate.

This Gem very readily parts with its colour in a ſmall fire, but is, when colourleſs, of much leſs brightneſs and brilliancy than the colourleſs Sapphire or Amethyſt.

It is found in great abundance in the iſland of Ceylon, and in ſome parts of America; and many of them are found in Sileſia; but the oriental are, as in all the other ſpecies, greatly ſuperior to the others in the fineneſs of their colour and in their luſtre.

Sect. VI. Green.

1. *Smaragdus.*
The Emerald.

The Gem, call'd by the antients Smaragdus, or the Emerald, was evidently the ſame with that we now know by that name; but in the days of Pliny we find there was a great deal of confuſion and error crept into the world about it; and that author has a long liſt of the different kinds, as he calls them, of it; among which there are evidently Jaſpers, and colour'd Cryſtals, and Spars reckon'd as ſpecies of Emerald. Our jewellers know only what they call two kinds of Emerald, the oriental and the occidental, and ſuch without queſtion there are, that is the Emeralds of the Eaſt Indies are evidently finer than thoſe of any other part of the world; but our jewellers ſeldom meeting with theſe, call the American Emeralds the oriental, and uſually ſell Cryſtal accidentally ting'd with green, under the name of the occidental Emerald: theſe being alſo the moſt common, there has grown an opinion among the lapidaries, that the Emerald is no harder than Cryſtal, becauſe what they take to be Emeralds, are indeed in general only Cryſtals.

The genuine Emerald, when in its moſt perfect ſtate, is perhaps the moſt beautiful of all the Gems: it is found of various ſizes, but uſually ſmall; multitudes are met with of about the ſixteenth of an inch in diameter, and they are found from this to the ſize of a walnut: we have accounts of ſome of immenſe ſizes among the antients, but they are evidently erroneous, the Stones not having been Emeralds, but Jaſpers, or other green Stones; the larger ſpecimens are at preſent very ſcarce, and when true Emeralds, whether they are oriental, as they are call'd, or occidental, are of conſiderable value, though greatly moſt ſo when of the Eaſt or Weſt-Indies. The Emerald is of different figures like the Diamond, and many of the other Gems, being ſometimes found in a roundiſh or pebble-like form, but much more frequently in a columnar one reſembling common Cryſtal, the pebble Emeralds are always the hardeſt and brighteſt, but are ſeldom found exceeding the ſize of a pea, and very rarely coming up to that of a horſe-bean; the cryſtalliform grow ſeveral together, and are often larger; the pebble kind are found looſe in the earth of mountains, and ſands of rivers, the columnar uſually are found bedded in, or adhering to a white, opake and coarſe cryſtalline maſs, and ſometimes to the Jaſper or the Praſius, which laſt has been therefore call'd the mother of the Emerald. The rough Emerald in whatever form, is uſually of a very bright and naturally poliſh'd ſurface, and is ever of a pure and beautiful green, without the admixture of any other colour. It is of all the various ſhades of green from the deepeſt to the paleſt, and doubtleſs is found at times wholly colourleſs, but then it is eſteem'd a Sapphire, all the harder Gems, when colourleſs, being call'd by our jewellers white Sapphires.

The oriental Emerald is of the hardneſs of the Sapphire and Ruby, and is ſecond only to the Diamond in luſtre and brightneſs; the American is of the hardneſs of the Garnet, and the European ſomewhat ſofter than that, yet conſiderably harder than Cryſtal; but the colour'd Cryſtals uſually ſold under the name of Emeralds, have much debas'd the credit of this Gem. It loſes its colour in the fire, and becomes undiſtinguiſhable from the white Sapphire.

The oriental Emeralds are very ſcarce, and are at preſent found only in the kingdom of Cambay; very few of them have of late been imported into Europe; inſomuch that it has been ſuppos'd there were no oriental Emeralds; but within theſe ten years ſome few have been brought from Cambay into Italy, that greatly excel all the American ones. The American, which are what our jewellers call oriental Emeralds, are found principally about Peru, in the earth of ſome mountains. The European are principally from Sileſia, though there are of them in other places; but the colour'd cryſtals, which we commonly meet with under the name of occidental Emeralds, are from the mines of Germany.

The ſcarcity of Emeralds in the Eaſt Indies gave birth to an opinion that has long obtain'd, and does ſo generally ſtill, that there never were any produc'd there; the ſkilfulleſt of our dealers in Gems will generally tell us, that there is no ſuch Stone as an oriental Emerald, but that all the fine ones are from Peru; and Tavernier, who could not get over the difficulty of there having been many brought from the Eaſt-Indies at one time, ſolves it by ſuppoſing that thoſe we had thence were originally brought from Peru; and to countenance this, gives us an account of the Peruvians trading by the South Sea to the Eaſt-Indies, before the Europeans diſcovered America; but this is a miſerable far-fetch'd conjecture, as no footſtep of ſo memorable a traffick ſubſiſts; and the truth ſeems to be, that though the people of the Eaſt Indies were once in a humour to part with their Emeralds, they have ſince choſe to keep them in their own hands: as it is well known to travellers, that the princes of the Eaſt are at leaſt as well acquainted as we with the value of Gems, and are willing to purchaſe thoſe which are not the produce of their own country at as large a price.

2. *Praſius.*
The Praſius.

This is the Gem call'd Praſites by the antients, and when of a larger than ordinary admixture of yellow the Chryſopraſus, and of which the Gem diſtinguiſh'd by later authors under the name of the Smaragdopraſus is only one of the varieties.

The Praſius much approaches to the nature of the Emerald, but wants its hardneſs, and is of a coarſer green with an admixture of yellow.

It is even in its moſt perfect ſtate much leſs beautiful than moſt of the other Gems; it is found of various ſizes, and not unfrequently conſiderably large; it is ſeldom met with ſmaller than a pea, from that to the ſize of a horſe-bean is its moſt frequent ſtandard, from this to the ſize of a nutmeg it is more rarely found; and the larger ſpecimens are coarſer and leſs frequent than theſe. It is of various figures, but never is found in a columnar or cryſtal-like form; in this, however, I declare againſt the opinion of our dealers in Gems, among whom I have been ſhewn regular hexangular columns with hexangular pyramids, of what they call'd, and what they bought and ſold for the Smaragdopraſius; but theſe were all no other than Cryſtals ting'd to a coarſe and dead green, and without any mixture of yellow, ſo that they were more properly Pſeudoſmaragdi than any thing of the Praſius kind, and ſuch as theſe I believe all the columnar Praſius's will be found: it is frequently of an orbicular form, flatted on one ſide, and convex on the other, and often oblong or oval; but more uſually it is of an irregular ſhape, made up of a number of flat faces, as we ſee ſome of the coarſer nodules of debas'd

Cryſtals from the German mines, and is uſually but of an obſcure, or much leſs polite ſurface than moſt of the other native Gems. Its colour is a deep, but not pleaſant green, uſually with ſomewhat of a blueiſh caſt, and always with a greater or leſs admixture of yellow; and in its moſt valuable pieces it is of the hardneſs of the Garnet, and in its worſt, which are truly Praſius's, is conſiderably harder than common Cryſtal. The columnar Praſius's, as they are call'd, are on the contrary, ever as ſoft, and often ſofter than pure Cryſtals. It is like the moſt of the other Gems at times found of all degrees of colour, from its full deep hue, to mere colourleſs Cryſtal; it is at times found alſo with more or leſs yellowneſs in the different ſpecimens, or in the different parts of the ſame ſpecimen, and has ſometimes a milky caſt among the green. Authors have diſtinguiſh'd it in theſe its different ſtates by four names.

1. The *Praſius* or *Praſites*, ſimply ſo call'd; this is the name given to the Gem in its moſt perfect ſtate, in which it carries in it a conſiderable ſhare of yellow with the green, and the green is of a more pure and graſſy colour.

2. The *Smaragdo Praſus.* This is the name given it when there is leſs yellow in the tinge, and the green has ſomewhat of a blueiſh caſt.

3. The *Chryſo-Beryllus.* This is the name given to the Praſius, when there is the ſame blueiſh caſt in the green, with a greater admixture of yellow.

4. The *Chryſo-Praſius.* This is the name given it when it has as large an admixture of yellow as in the Praſius ſimply ſo call'd; and its green is a pure, but pale one.

And finally, de Boot mentions another kind of Praſius as he calls it, which is more opake than the reſt, and has but little green, and a large admixture of white among the yellow; but this is one of the Nephriticus's.

The fineſt of theſe are found in the iſland of Ceylon, but there are many very good ones in New-Spain. We have of them alſo from Sileſia and Bohemia, but theſe are very poor ones.

3. *Chryſolithus; Qui Topazius antiquorum.*
The Chryſolite; which is the Topaz of the antients.

All the modern jewellers, and thoſe of ſeveral ages before them, have agreed in calling this Stone the Chryſolite; though it is evidently what the antients knew under the name of the Topaz; and the true Chryſolite of the antients, which had its name from its fine gold yellow colour they now call univerſally the Topaz.

The Chryſolite of our times, the Topaz of Pliny and the antients, is even in its moſt perfect ſtate a Gem of but ſmall beauty and of little value. It is found of various ſizes, and ſome of the coarſer pieces vaſtly larger than the maſſes of any of the other Gems: Its moſt common ſize, however, when pureſt and moſt valuable, is about the bigneſs of a nutmeg. It is of very various figures, but never columnar or in the form of Cryſtal; it is in ſome places found ſmall and in roundiſh or irregular pebble-like maſſes, in others generally oblong and flatted, and is always of a rude ſurface, and leſs bright than any other of the native Gems. Its colour is a pale and dead green, with a faint admixture of yellow; it has theſe colours in different degrees in the different ſpecimens, but its moſt uſual tinge is the colour of an unripe olive, with ſomewhat of a braſſy yellow among it; though it ſometimes has the pale and duſky green of the worſer Praſius, ſeemingly obſcur'd with a ſomewhat browniſh caſt and mix'd with the ſame braſſy yellow: It is very ſoft in compariſon of the other Gems, and in its fineſt pieces does not exceed Cryſtal in hardneſs, and in its worſer is much ſofter than that: it takes a good poliſh, and in ſome of its pureſt maſſes makes ſome figure, but is at beſt vaſtly inferior to the other Gems.

Our jewellers take little notice of it, and are ſo far from having two or three names for it, that the leſs accurate among them very often call it a Praſius, and the Chryſopraſius a Chryſolite.

It is found in New Spain, and in ſeveral parts of Sileſia and Bohemia. The American are greatly ſuperior to the European, but are uſually ſmall; the Bohemian are very large, and few of them are of a clear colour or free from flaws.

SECT.

Sect. VII. Yellow.

Topazius; Qui Chryſolithus antiquorum.
The Topaz, which is the Chryſolite of the antients.

There remains not the leaſt doubt from the accounts of the antients, but that the Gem they call'd from its colour the Chryſolite or gold-colour'd Gem, was the very Stone which we call the oriental Topaz.

The Topaz, or Chryſolite of the antients, is a very valuable and beautiful Gem in its pureſt and moſt perfect ſtate, but ſuch are very rare; and the leſs perfect ones common among our jewellers are of little price or value. It is never found very large, the far greater number of the oriental ones are as ſmall as the head of a large pin; and it is but here and there one which arrives at a ſixth of an inch in diameter, and very few exceed that ſtandard; the American are ſomewhat larger than theſe, and the European largeſt of all, but of the leaſt value.

It is ever found in a pebble-like form, roundiſh or oblong, uſually flatted on one ſide, and of an irregular and uneven ſurface, but conſiderably bright, and of a good natural poliſh, unleſs where foul'd by accidents. It is never found in a columnar or cryſtal-like form, notwithſtanding that our dealers in Gems carry on a large trade with what they call Topazes, which are of this ſhape; for all theſe when brought to the wheel are found to be no other than common Cryſtals accidentally ting'd, as is very common, by metalline particles; and almoſt all the Topazes worn in rings are of this falſe kind.

Its colour is ever a pure yellow, but like the other Gems it has its tinge in different degrees; the fineſt Topazes are of a true and exact gold colour, and are of great ſplendour; but they vary from this in degree up to the deepeſt ſaffron colour, and down to that of the paleſt amber. The finer pieces of Topaz are of equal hardneſs with the Ruby or Sapphire, and ſecond only to the Diamond; from this they degenerate to all the degrees of the Garnets; but in the very meaneſt of the genuine pieces when brought to the wheel, are found to be conſiderably harder than Cryſtal. The fineſt Topazes have a luſtre at leaſt equal to any Gem, except the Diamond; but the others are but dead and heavy: the oriental pieces diveſted of their colour by fire, make a very cloſe counterfeit of the Diamond.

Our jewellers have but one name for all the Topazes and for the colour'd cryſtals, which they confound with them; but the antients diſtinguiſh'd them according to their ſeveral degrees of colour: What they call'd ſimply the Chryſolite, was of the pure colour of gold, and was expreſs'd by the Greeks by the name χρυσίζων, and by the Latins by *Aureus*, and *aureo colore tranſlucentis*; which are Pliny's characters of the Stone. Thoſe of a paler yellow, reſembling amber, they call'd Chryſolectra; and ſome which had accidental blemiſhes of white, they call'd Lucochryſa; and others which had the honey colour, a ſomewhat obſcurer yellow than the Chryſolectra, they call'd Melichryſa.

The Topaz is found in the Eaſt and Weſt-Indies, and in ſeveral parts of Europe; the oriental are greatly ſuperior to thoſe of any other part of the world; and the American are not much better than thoſe of Germany.

The fineſt Gem of this kind ever known, is in the poſſeſſion of the Great Mogul; its weight is ſaid to be 157 carats, and its value more than twenty thouſand pounds.

Genus II.

CHROASTACES.

Pellucid Gems of variable colours, as view'd in different lights.

Sect. I. Whitiſh.

Opalus.
The Opal.

This is a Gem of a very peculiar kind, and has been eſteem'd by many in all ages of very great value, though at preſent it is of leſs price in proportion to its ſize than any of the finer Gems. The Romans eſteem'd it the fourth Gem in value; and I think its beauty and ſingularity of appearance may entitle it to at leaſt that rank.

It is ſofter than any other of the fine Gems, and is difficultly poliſh'd to any degree of nicety. It is found of various ſhapes and ſizes; its moſt frequent bigneſs is between that of a pea and a horſe-bean; but it is found as ſmall as the head of a large pin, and has been ſeen of the ſize of a large walnut. Its figure is very various and uncertain, but it never is found in a cryſtalliform or columnar ſtate, its moſt uſual ſhape is an irregularly oblong one, convex above, flatted at bottom, and dented with various ſinuoſities at its ſides; there have been ſome found of the regular ſhape of a kidney, and others almoſt perfectly round, and not unfrequently it is met with in ſmall flat pieces. It is often found among the looſe earth of mountains, ſometimes on the ſhores of rivers, and not unfrequently bedded in the coarſer kinds of Jaſper, ten or twenty Opals of different ſizes and colours being often found in one Stone.

It is naturally of a ſmooth ſurface and tolerable gloſs, and many of the fineſt Opals that have been ſeen have been worn with their native poliſh. Its colour, as it appears in a fine ſpecimen, is of ſo mixt a nature as not to be eaſily deſcrib'd, but is much better expreſs'd by comparing it to the fineſt ſort of mother of pearl than by any other ſet of words. It differs, however, greatly from this in its ſuperior luſtre and brightneſs, and in its being more pellucid, ſo that one ſees deep into the Stone; as it is variouſly turn'd about, it ſhews the colours of almoſt all the other Gems; it has the yellow of the oriental Topaz, the fine pale yet bright red of the Ruby, the fire colour of the Carbuncle when held againſt the ſun; the blue of the Sapphire, the purple glow of the Amethyſt, and the fine green of the pureſt Emeralds, with the white milky caſt of the Leuco Sapphirus: all theſe colours are pale and of a fine brightneſs and luſtre; and the fire colour particularly is much ſuperior to that of the Carbuncle or any other Gem, and ſeems to lie deep in the Stone, and only ſhew itſelf in a fine ſtrong glow, as it is turn'd to the different lights. It muſt be acknowledg'd, however, that all theſe colours are but the effect of different reflections of light falling on it in different angles, and are not like the ſingle colours of the other Gems, permanent and unalterably in the body; for the ſmaller fragments of Opals, even of the fineſt kind, do not ſhew them, but are of a pale blueiſh or pearly grey, which is properly the genuine colour of the Stone.

It is the moſt difficult to be well counterfeited of all the Gems, and the beſt of all things for this purpoſe, is a very nicely choſen piece of a pearly ſhell.

The antients call'd it the Pœderos, though that was by no means a determinate name, it having been alſo given by ſome to the Amethyſt, and indeed to moſt of the finer Gems. It is in different degrees of perfection and beauty in the different ſpecimens, and ſometimes wants one or more of the colours, and is liable to be ting'd with a deep blueiſh black; in which caſe it gives only its red and no other of its colours in any light; but the red in this caſe appears more than ordinary glowing and fiery, and ſeems lodg'd very deep in the Stone; ſo that in this, though but an imperfect ſtate, it has in ſome ſort a ſuperior beauty to even its fineſt ſpecimens. Sometimes alſo, it is all over ting'd with yellowiſh, and the other colours are in theſe pieces ſeen but with very little luſtre, and ſome have a general caſt of a pearly grey, which in the ſame manner over-bears all the other colours. Theſe are great blemiſhes, and are principally found in the European kinds.

The Opal is found in Ægypt, Arabia, ſome parts of the Eaſt Indies, and in many parts of Europe; the oriental ones are in general finer than the European, but they are not univerſally ſo, they are found in the looſe earth of mountains: thoſe of Europe are principally from Bohemia, where they are ſometimes found looſe, but more frequently are bedded in a variegated Jaſper.

SECT. II. Browniſh.

Aſteria; Quæ Oculus Cati recentiorum.
The Aſteria; Call'd the Cat's Eye by our jewellers.

This is a very ſingular and very beautiful Gem, and ſomething approaches to the nature of the Opal, in having a bright included colour, which ſeems to be lodg'd deep in the Stone, and ſhifts about as it is mov'd in various directions; but it differs from the Opal in all other particulars, and among other very obvious ones, in its want of the variety of colours and in its ſuperior hardneſs.

It is leſs various in ſhape and ſize than many of the other Gems, being uſually found between the ſize of a pea and the breadth of a ſixpence, tho' often much ſmaller and not very unfrequently larger, and is almoſt always of a regularly ſemicircular form, being convex at the top, and flat at the bottom, it is naturally of a ſmooth and polite ſurface, and is uſually worn with its native poliſh. It has only two colours, a pale brown and a white; the brown ſeeming naturally the ground, and the white playing about in it, and ſeeming deeply ſunk in the bottom of the Stone, as the fire colour in the Opal. This whiteneſs ſhifts about in it in the ſame manner alſo as the red in the Opal; and as the Stone is mov'd about in various directions, ſeems a lucid ſpeck; or as the antients have call'd it, a ſmall ſtar moving about to all parts of it: this is the caſe with thoſe which have leſs of the white in them, but ſuch ſpecimens as have more of it, appear always whiter on one whole ſide than on the other; and in ſome lights one may ſee a ſort of white line, dividing the Gem as it were into two parts: The brown and white are its only natural colours, but is liable, like moſt other Stones, to ſome accidental tinges; and there are pieces of it met with, which are greeniſh, blueiſh, and yellowiſh, but they are all the worſe for theſe variegations, never ſhewing the included light ſo well. It is conſiderably hard, but greatly leſs ſo than the oriental Gems, and will take a fine poliſh, though its natural one is ſo good that it is ſeldom wrought.

It is found in the Eaſt and Weſt Indies, and in Europe: the iſland of Borneo affords ſome very fine ones, but they are uſually ſmall; they are very common in New Spain, in the ſands of rivers, and in Bohemia are found very frequently immers'd in the ſame maſſes of Jaſper with the Opal. Of this I can ſpeak with ſome degree of certainty, having ſeen a piece of the Jaſper, with a large Aſteria and two ſmall Opals bedded in it, and with a cavity, out of which the perſon who poſſeſs'd it aſſur'd me, that he had taken a large Opal, which he ſold for ſix guineas.

The reader will not expect to find the hiſtory of pearls here, they belonging to the third volume which treats of the animal kingdom. The Turquoiſe alſo, tho' eſteem'd a native Gem by many, is of two kinds, the one a copper ore, to be ſeen in its proper place; the other an animal ſubſtance, ting'd by cupreous matter, which will therefore be found among the extraneous Foſſils.

THE HISTORY OF FOSSILS.

PART the SECOND.

BOOK II.

FOSSILS naturally and eſſentially compound, not inflammable, ſoluble in water.

Of this ſeries of Foſſils there is but one Claſs.

The bodies conſtituting this Claſs are,

The Metalic Salts.

Foſſils not inflammable, but fuſible in the fire, ſoluble in water, and ſeparable again from it by cryſtallization, impregnated with the particles of metals, and impreſſing an acrid and nauſeous ſenſation on the tongue.

The true origin of all theſe compound Salts is, that they are compos'd of the particles of metals, diſſolv'd by the acid of ſulphur, and by means of water reduc'd into the form of a Salt, ſo that they very much approach to the nature of metals.

Of this Claſs there are two Orders, and under thoſe three Genera.

Metalic SALTS.

Order the firſt.

Thoſe found naturally in a ſolid form.

Order the ſecond.

Thoſe found naturally in a liquid ſtate, or ſuſpended in water.

Metalic SALTS.

Order the firſt.

Genus I. VITRIOLA. *Compound Salts, of an even and regular ſtructure, firm, hard and tranſparent, and naturally pure.*

Genus 2. CHALCANTHA. *Compound Salts, of a more coarſe and irregular ſtructure, conſiderably hard, and naturally impure and opake.*

Metalic SALTS.

Order the ſecond.

Of this Order there is only one Genus, and of that but one known Species.

This is the water from which the blue Cyprian Vitriol is procured.

Compound FOSSILS, ſoluble in water.

SERIES I.

CLASS I. ORDER I. GENUS I.

VITRIOLA.

Compound Salts, of an even and regular ſtructure, firm, hard and tranſparent, and naturally pure.

1. *Vitriolum vireſcens.*
Green Vitriol.

THIS is a native Foſſil Salt, in many reſpects perfectly agreeing with the common artificial green Vitriol, procured from the Pyrites and old iron, and ſold in the ſhops under the name of Copperas; or with the Salt of iron, produc'd by means of oil of Vitriol and water: and very evidently owes its origin wholly to a ſolution of particles of iron in the acid of Sulphur, by the aſſiſtance of water, from which it has been again ſeperated by ſome ſubterranean heat.

It is a beautiful, very pure and pellucid ſubſtance, of a compact, even and regular texture, and very conſiderably hard and heavy. It is of no determinate figure, being never met with in the true form of its Cryſtals, procur'd by evaporation; but is ſometimes found in irregularly ſhap'd maſſes of various ſizes, from an ounce to a pound or more in weight, and cover'd with numerous irregular prominences on the ſurface: and not unfrequently it hangs down from the tops, or along the ſides of caverns, in form of Stalactitæ or Icicles, and is then called Stalactical Vitriol. Theſe are from the thickneſs of a ſtraw to three inches in diameter, and from an inch to two foot long; they are not of a very regular ſurface, but full of various prominences and cavities, but are of a perfectly equal ſtructure, breaking with a ſmooth, even and gloſſy ſurface.

It is in colour of a fine pale graſſy green, and is very bright and tranſparent.

It will never run per deliquium, or wholly melt away in a moiſt air, but is apt to be a little humid at the ſurface.

It very readily diſſolves in water, and after evaporation concretes again into thick rhomboidal Cryſtals.

Expos'd to the fire, it firſt becomes a grey powder, without any remainder of greenneſs, and afterwards calcines to a deep purple.

It is found in the caverns of the mines, and perpendicular fiſſures of the rocks at Goſſelaer in Saxony, in great abundance; and is met with, tho' in leſs plenty, in many of the German mines.

2. *Vitriolum*

2. *Vitriolum cæruleo-virens.*
Blueiſh-green Vitriol.

This is a more beautiful Foſſil than the former, and of a much more pleaſing colour, and is evidently prov'd by experiments, to be form'd of a mixt ſolution of the particles of iron and copper in the acid of Sulphur, which, by the aſſiſtance of water, is form'd into a metalic Salt, no way differing from what may be produc'd by art, from a ſolution and cryſtalization of thoſe metals in the ſame menſtruums.

It is a very pure ſubſtance, of a firm, compact and even texture, and conſiderably heavy; it is found of various ſizes, but ſeldom very large, and is uſually of a ſomewhat rudely orbicular form, covered with multitudes of imperfect and mutilated rhomboidal Cryſtals; it is ſometimes alſo found coating over the ſides of fiſſures of Stone, in cruſts of an inch thick, and of conſiderable extent, and ſometimes concreted round ſhoots of the various Cryſtals and Spars: and in all theſe figures, tho' its bottom ſurface where it adheres to the ſubſtance it coats over is ſmooth, and its general maſs of no regular figure, yet its outer ſurface always is covered with concretions, approaching to Rhomboids; theſe are very ſmooth and polite, and the whole maſſes are moderately firm and hard, and break with an even and bright ſurface. Its colour is a blueiſh-green, very exactly that of the Beryll, or Aqua marine Gem, and it is very bright and tranſparent.

It will not run per deliquium, but ſometimes feels a little moiſt on the ſurface in damp weather.

It very freely diſſolves in water, to which it gives its ſea green colour, and is by a regular evaporation and cryſtalization, to be again procur'd from it, in form of ſomewhat thick and ſhort Rhomboidal Cryſtals.

In the fire it calcines firſt to a greyiſh white, and afterwards to a deep purple.

It is ſometimes found in the mines of Goſſelaer in Saxony, but more frequently in thoſe of Hungary and Tranſilvania, and is very common alſo, ſeveral of thoſe on the Hartz Foreſt.

3. *Vitriolum albeſcens.*
White Vitriol.

This is in all reſpects, except figure, the ſame ſubſtance with the white Vitriol of the ſhops, as that indeed is no other than this Salt diſſolv'd, and again concreted; there being in nature no other known white Vitriol; nor is it in the power of art to contrive any tolerable counterfeit for it. It owes its origin, like the reſt, to iron and copper, diſſolv'd by the acid of Sulphur and water, and again concreted into this form; but it contains ſome other ſubſtance beſide theſe, poſſibly lead, poſſibly ſome other mineral, not of the claſs of the metals, to which it owes its colour, and mode of exiſtence, and which art cannot add to the compoſition, till it firſt knows what it is.

It has been vulgarly ſuppos'd, that this was a preparation of the common green Vitriol by fire, but experiment proves the contrary, and it is well known by all who have ſeen the mines at Goſſelaer, to be a native Foſſil.

It is in its moſt perfect ſtate a firm and compact ſubſtance, moderately hard, and conſiderably heavy, of no determinate ſhape or ſize, but found coating over the ſides of fiſſures of rocks, in ſmall cruſts, often roundiſh, but more uſually of ragged and unequal edges, of a ſmooth ſurface, moderately hard, and in ſome degree pellucid in ſmall pieces. The great Geoffrey mentions pieces of it found there pellucid as Cryſtal, but I have not been able yet to procure any ſo fine; and even what is here deſcrib'd is a ſtate it is very rarely found in. Its common appearance being in form of a downy efflo-reſcence, which ſtands very thick on the walls of ſubterranean caverns, and the roofs of hollows, made in working for ores; it is in this ſtate of a light ſubſtance, and of a very lax texture, very readily mouldering to pieces between the fingers, and of a duſky, and ſometimes browniſh or yellowiſh white. In either of theſe ſtates it very readily diſſolves in water, and after evaporation is reduc'd to the large cakes, in which we receive it in the ſhops.

It is produc'd in the mines at Goſſelaer in Saxony, and thoſe of Cremnitz in Hungary, and in the Eaſt Indies. Theſe Vitriols have their ſeveral uſes, and thoſe very great ones, both in medicine and mechanics. The green and blue are us'd by the Dyers of all kinds in Germany, and the factitious green, call'd Copperas in England, which is much the ſame ſubſtance, for dying hats and cloths black. It ſerves alſo to make ink, tho' the white is greatly preferable on this occaſion, but its uſe not known among the common ink makers; and the acid liquor, call'd oil of Vitriol, is diſtill'd from it. The powder of the blueiſh green is alſo a famous Styptic in the German ſhops, and well known among the miners, who ſtrew it into any wounds which they get, to ſtop the bleeding; the white is a gentle and ſafe vomit, and is us'd externally in collyriums for the eyes, and in injections in Gonorrhœas.

The Antients were well acquainted with the native green Vitriol, and even knew it in its ſtalactical form as we call it; Dioſcorides having expreſſly deſcrib'd and call'd it Stalactis and Pinarion, and long ſhap'd native Vitriol. The factitious he alſo tells us was made by diſſolving the vitriolic matter in water, then boiling the liquor to a proper conſiſtence, and ſetting it to ſhoot in proper veſſels, where it form'd itſelf into a number of teſſelated bodies, hanging to one another in cluſters.

Compound FOSSILS, ſoluble in water.

SERIES I.

CLASS I. ORDER I. GENUS II.

CHALCANTHA.

Compound Salts, of a more coarſe and irregular ſtructure, conſiderably hard, and naturally impure and opake.

1. *Chalcanthum fuſco-rubeſcens. Quod Chalcitis Antiquorum. Browniſh-red Chalcanthum. The Chalcitis of the Antients.*

This is a Foſſil ſubſtance, which, tho' commonly known by name among authors, has been hitherto but little underſtood. Many have accounted it a native red pure vitriol, which is by no means the caſe, and the generality of authors have eſteem'd it one of the loſt Foſſils of the Antients, but this alſo far from being the fact, ſince it is commonly known in the Turkiſh dominions, and us'd there in medicine.

It is a ſoft friable ſubſtance, of a very irregular ſtructure, and conſiderably heavy. It is found in detach'd maſſes of various ſizes, from an ounce to two or three pound in weight; and is uſually of a flatted ſhape, with a tolerably even ſurface, but mark'd with various clouded or undulated lines; it is ſoft to the touch, and breaks with a ſlight blow, ſhewing a very irregular ſurface where broken, being compos'd of various ſeries of ſhort wav'd and undulated ſtriæ; there are often five or ſix ſeries of theſe in a maſs of three quarters of an inch thick, but other parts of the ſame maſs ſometimes are of a plain uniform ſtructure, without the leaſt appearance of ſtriæ: It has no inveſtient coat, but ſhews its own naked ſurface, and is always of a duſky browniſh red, ſomewhat like the colour of unpoliſh'd copper.

It is too ſoft to give fire with ſteel.

It ferments not at all with Aqua Fortis.

It burns firſt to a duſky orange colour, and afterwards to a deep purple.

Water is capable of diſſolving only its more ſaline part, which may afterwards be procur'd in vitriolic Cryſtals, of a ſea green colour, and ſomething approaching to a Rhomboidal ſhape, ſo that the ſubſtance is properly a mixt ore of the cupreous and ferrugineous Vitriol.

It is found looſe in the earth in many parts of the Turkiſh dominions, and is a common medicine in ſome places, being given internally after calcination in Fluxes and Hæmorrhages, and as it is ſaid with great ſucceſs.

There is no doubt but that it is the very ſubſtance deſcrib'd by the antient Greeks, under the name Chalcitis; the deſcription of Dioſcorides perfectly agreeing with, and very well expreſſing it; he ſays, Chalcitis was of the colour of copper, friable, not ſtony, and mark'd with ſhining veins or ſtreaks; he accounts it one of the more ſlightly corroſive medicines, and recommends it externally in Collyriums for the eyes, and in caſes of Hæmorrhages, the Eriſipylas and Herpes; but the Antients ſeem not to have known the uſe of it internally ſo early as theſe times, tho' among the Romans it was well known alſo in internal preſcriptions, and made an ingredient in the famous Theriace Andromachi.

2. *Chalcanthum flaveſcens.* *Quod Miſy Græcorum.*
Yellow Chalcanthum. *The Miſy of the antient Greeks.*

This is another of the Foſſils of the Antients, ſuppos'd loſt of later ages, but which is ſtill very common in the Turkiſh dominions, and ſometimes found in the mines at Cremnitz in Hungary. It is a conſiderably firm ſubſtance, tho' of an irregular and ſeemingly not compact texture, and much reſembles ſome of our more gaudy Marchaſites, but that it wants their hardneſs and weight, and is not inflammable. It is of no determinate ſhape or ſize, but is found ſometimes in ſmall detach'd maſſes, which are uſually broad, flat, and very ragged at their edges, and ſometimes conſtitutes whole ſtrata, which are continued for many yards in length, but ſeldom are more than three inches thick, and uſually lye like horizontal veins among other metallic minerals. It is ſoft and ſmooth to the touch, of an irregular ſurface, of ſome hardneſs, yet not ſo much but that it may eaſily be rub'd to pieces between the fingers, and is both within and without of a very fine bright and ſhining pale yellow, having much the appearance of braſs when that metal is very bright and clean ſcower'd. Its internal ſubſtance ſeems made up of numbers of variouſly ſhap'd ſmall Moleculæ, moſtly of angular figures, and it is never cover'd with any inveſtient coat or cruſt; but when it has lain ſome time expos'd to the air, it is of a duſkier colour on the ſurface, than when freſh broken.

It will not give fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a deep purple.

Water diſſolves a very conſiderable part of it, which may afterwards be ſeparated by cryſtallization, and is found to be of the ſame nature with the common green Vitriol; its Cryſtals being of the ſame figure, and its effects on a decoction of Galls; the ſame inſtantly tapering it into ink; it has ſo much of the external appearance of a ſulphureous body, that it ſurprizes one to find it not inflammable.

It is ſufficiently common in many parts of Turky, but is no where put to any uſe. The Antients had it from Ægypt, and the iſland of Cyprus, and eſteem'd it of the ſame nature with the Chalcitis, but poſſeſſing its qualities in a more remiſs degree. Dioſcorides deſcribes it to have been a firm ſubſtance, of a fine yellow, and very bright and glittering.

3. *Chalcanthum ferrugineo-nigreſcens.* *Quod Sory Antiquorum, & Ruſma Recentiorum.*
Blackiſh Chalcanthum. *The Sory of the Antients, and Ruſma of the Moderns.*

This is another of what have been ſuppos'd the loſt Foſſils of the Antients, but it is found to be yet very plentifully produc'd, and much us'd in many parts of the Eaſt, only under another name; neither indeed is it peculiar to that part of the world, tho' the inaccuracy of the late writers of Foſſils has made them over-look it.

It is a firm, and not brittle ſubſtance, tho' of a ſpungy and very cavernous texture. It is conſiderably heavy, and is found in detach'd maſſes, of no determinate ſhape or ſize; they are ſometimes roundiſh, very often oblong, and frequently flatted, and are, from the ſize of a walnut, to that of a man's head. It feels harſh and rough to the touch, and is cover'd with no inveſtient coat or cruſt, but ſhews its natural ſurface, which is always irregularly corrugated and wrinkled, or full of ſmall protuberances and cavities. It requires a ſomewhat ſmart blow to break it, and ſhews, when broken, a very rugged and ſpungy ſurface. It is naturally of a ruſty black in colour, but is ſometimes conſiderably reddiſh, and at other times blueiſh, and is always ſtain'd in ſome places with ſpots of a ruſt colour, and others greeniſh or blueiſh, and in the places where it is free from theſe, it is ſomewhat bright or ſparkling. It is of a very ſharp and diſagreeable taſte, and of a ſtrong and nauſeous ſmell.

It will not give fire with ſteel.

It ferments not at all in Aqua Fortis.

It burns to a deep purple.

Water diſſolves a part of it, which, when ſeparated by cryſtallization, appears to be pure blue Vitriol, ſhooting into very regular Rhomboidal Cryſtals, and tinging iron of a copper colour, by wetting and rubbing it on it.

It is found in many parts of the Turkiſh dominions, particularly in Gallogræcia, and in ſome parts of Germany; in the laſt of theſe places it is boil'd for the Vitriol it contains, and in the former it is mix'd with lime, and made into a paſte with water, which is laid on ſuch parts of the body as they wou'd eradicate the hair from, which purpoſe it effects in a few minutes.

The Antients us'd it externally to take off pimples, and put a piece of it into a hollow tooth, as a remedy for the tooth ach. There can be no doubt of theirs being the ſame ſubſtance with this, ſince Dioſcorides deſcribes it to have been black, full of ſmall cavities, fattiſh or moiſt on the ſurface, as ours always is in damp weather, and of a diſagreeable taſte and ſmell.

This, the two preceding, and the following ſubſtance, are all properly ores of Vitriol; the particles of thoſe Salts being ſo perfectly blended in them, as not to appear to the naked eye, yet being always ſeparable from them by water.

4. *Chalcanthum aureum, friabile. Quod Melanteria Antiquorum.* *Gold colour'd, friable Chalcanthum. The Melanteria of the Antients.*

This is another of the ſuppos'd loſt Foſſils of the Antients, but is really produc'd at this time in many different parts of the world, tho' its reſemblance to ſome other bodies of the Foſſil kingdom, has made it almoſt univerſally overlook'd by thoſe who have treated on theſe ſubjects.

It is in its moſt perfect ſtate a very beautiful ſubſtance, of a cloſe, even and regular texture, moderately heavy, and of an extreamly beautiful yellow, like that of the fineſt gold; it is in this ſtate found in irregular lumps, never very large, being uſually from half an ounce to two ounces in weight, and when pure and ſolid of a ſmooth, even and polite ſurface, tho' irregularly ſhap'd; and as bright, and of as fine a colour on the outſide as within; this is a ſtate, however, in which it is very rarely found, we uſually meet with it either in form of an efflorеſcence on various ſpecies of vitriolic bodies, or in looſe, ſhattery and friable maſſes, of rough ſurfaces, a ſpungy texture, and a coarſer yellow: In either ſtate, however, it ſo much reſembles a more or leſs pure native Sulphur, that it is generally miſtook for that body.

It is too ſoft to give fire with ſteel.

It makes no effervеſcence with Acids.

Put into the fire it is found to be not at all inflammable, but calcines firſt to a whitiſh, and finally to a ſtrong red colour.

Water diſſolves a part of its ſubſtance, which may be again procur'd from it, in form of Rhomboidal blueiſh green Cryſtals.

It is found about the mines of ſome parts of the Hartz Foreſt in Germany, and is often met with on the ſides of hills, in different parts of the Eaſt Indies, and in America.

Compound FOSSILS, ſoluble in water.

SERIES I.

CLASS I. ORDER II. GENUS I.

Metallic Salts, found naturally in a fluid ſtate, being ſuſpended in water, and to be ſeparated thence by cryſtallization.

Vitriolum Cæruleum.
Blue Vitriol.

THIS is a ſpecies of Metallic Salt, which, though very common among us in a ſolid form, is not found naturally ſo, but is procur'd by cryſtallization from the waters of certain ſprings, which ariſe among mines of copper: it being no other than the particles of copper diſſolv'd by the acid of ſulphur and water; whence, like the other ſolutions of metals in the ſame menſtruums, whether natural or artificial, it may be ſeparated in form of Cryſtals.

In the neighbourhood of many of the German and Hungarian mines, in which there is copper; as alſo from the hills in many parts of the Eaſt Indies and America, there are found ſmall ſtreams of a blueiſh water very pellucid, but of an auſtere and very diſagreeable taſte; theſe are call'd by the Germans Cement Springs: to try whether theſe contain blue Vitriol in a ſtate of ſolution, a piece of iron is to be plung'd in, which being immediately taken out again, is found coated over with a thin cruſt of copper; and if iron be ſuffer'd to remain long in the water, it is by degrees diſſolv'd and carry'd off, and the copper is precipitated and left in its place. This copper is alſo frequently of a botryoidal appearance, like the ſurface of many of the ſpecimens of the Hematites or bloodſtone, and like that body is ſeen to be compos'd of parallel fibres within.

This water is ſav'd in proper reſervoirs, and uſually there are earths impregnated with the ſame principles in the neighbourhood of the places, and often large quantities of Sory; theſe are thrown into the liquor and boil'd in it: or where they are not to be had, the liquor is boil'd alone to a proper conſiſtence, when being ſet to cryſtallize, it ſhoots into the beautiful figures we ſee the Vitriol of, which are regular Rhomboidal Cryſtals, compos'd of ten planes, and flat or thin in proportion to their ſize, and of a beautiful blue. Theſe Cryſtals, if wetted and rub'd on the blade of a knife, tinge it like their parent liquor to a fine copper colour. Many have affirm'd, that this ſalt is found native like the other Vitriols; but what I have ſeen ſhewn truly native, has been all of the common blueiſh green Vitriol of iron and copper, not this pure cupreous kind.

Nor is there I believe any ſuch thing as pure Vitriol of this kind in its proper Cryſtals any where found, except by the accidental evaporation of its water by the ſun, or by ſubterranean heats. Of ſuch blue Vitriol as this we have frequent inſtances in the German mines, and ſome in thoſe of our own kingdom; but this is only in ſmall quantities, and is by no means a Foſſil in its native ſtate.

THE
HISTORY
OF
FOSSILS.

PART the SECOND.

BOOK III.

FOSSILS naturally and eſſentially compound, not ſoluble in water.

INFLAMMABLE.

Of this Series of bodies there are three Claſſes.

The firſt. The MARCHASITÆ. *Compound, inflammable, metallic bodies, naturally conſtituting whole ſtrata.*

The Second. The PYRITÆ. *Compound, inflammable, metallic bodies, found in detach'd maſſes, of no determinate figure.*

The third. The PHLOGONIÆ. *Compound, inflammable, metallic bodies, found in ſmall maſſes, of determinately regular angular figures.*

Compound inflammable FOSSILS.

CLASS I.

MARCHASITÆ.

Compound, inflammable metallic bodies, naturally conſtituting whole ſtrata.

The bodies of this Claſs are all comprehended under one Genus, and tho' by their admixture with adventitious matter, the ores of metals, and other Foſſil bodies, their varieties are extreamly beautiful and almoſt innumerable, yet their diſtinct ſpecies are very few, all that the Naturaliſt can allow to be ſuch being only three.

Marchaſites are ſolid, hard compound Foſſil bodies, of an obſcurely and irregularly foliaceous ſtructure, of a bright glittering appearance, naturally found conſtituting whole

whole ſtrata, though ſometimes in detach'd maſſes; very freely and readily giving fire with ſteel, not fermenting with acid menſtruums, inflammable, yielding a blue ſulphureous flame, and afterwards calcining into a purple powder.

1. *Marcaſita argentea.*
Silver colour'd Marcaſite.

THIS is a very elegant and beautiful body, of a very firm and compact, though ſomewhat irregular texture; and very remarkably heavy. It is naturally found conſtituting whole ſtrata of very great extent, though never of any great thickneſs, from three inches to a foot in depth being their uſual ſtandard: but ſometimes like many other bodies naturally conſiſting ſtrata, it is found in large irregular and broken maſſes. It is, when broken, of a very irregular and uneven ſurface, and is ſeen to be made up of multitudes of irregularly ſhap'd flaky bodies, of very various ſizes, and not diſpos'd with the leaſt regularity, but oddly contorted, and wav'd, and wraping round one another. In ſome maſſes of this body this ſtructure is ſeen very diſtinctly, the ſeveral plated bodies being more looſely conjoin'd; but in others it is ſcarce diſtinguiſhable to the naked eye, the whole being as it were run into one ſolid maſs, and the compoſition more cloſe: and ſuch is the variety of this body, that this difference is often perceived in the ſpace of an inch of the ſame fragment of the body. Its colour is an extreamly bright white, very much like that of ſilver, but much more gaudy and glittering.

It very freely and readily gives fire with ſteel.

It makes no efferveſcence with Aqua Fortis.

When put into the fire it cracks and burſts, yielding a blue flame with a ſulphureous ſmell: it burns thus for a conſiderable time, and finally calcines to a ſtrong deep red.

The Microſcope ſhews its ſtructure to be the ſame in its moſt ſolid parts as it is ſeen by the naked eye in the more lax ones.

This is the uſual appearance of this body, but it is liable to a vaſt number of varieties; ſometimes it contains a large quantity of lead ore, ſometimes of that of tin, and very often a duſky brown ferrugineous matter is intimately mix'd with it; at other times ſome of the cubic or regularly figur'd Phlogoniæ are immers'd in it; and ſometimes, where it has room, its conſtituent flakes riſe on its ſurface in conjunct ſeries, and form a very elegant foliaceous top to it. Nor is this all, for very frequently where there has not been enough of it to form a ſtratum, it has been depoſited in ſmall ſpecks of a more or leſs complex, but always flaky ſtructure on Stones or ores of various kinds, and thus uſually makes a very beautiful and glittering appearance frequently, beſide its natural bright white ſhining with all the colours of the rainbow on different parts of its ſurface, as they are differently turn'd to the light.

It is found in vaſt abundance in the lead and tin mines of all parts of England, and is no leſs common in other countries; our counties of Devonſhire, Derbyſhire, and Cornwal, abound with prodigious quantities of it.

2. *Marcaſita aurea.*
Gold colour'd Marcaſite.

This is a more beautiful and glittering ſpecies than the former. It is of a moderately firm ſtructure, but leſs compact texture than any other Marcaſite. It is conſiderably heavy, and is uſually found in long but very thin ſtrata, ſometimes accidentally in large and miſ-ſhapen nodules. It breaks with a moderate blow, and is ſeen to be compos'd of a very irregular congeries of flat flaky Moleculæ, reſembling multitudes of irregular fragments of leaf gold, crouded confuſedly into a compact maſs. In ſome parts of this ſpecies the texture is, as in the other Marcaſites, more lax and open than in others; but it is every where plainly diſtinguiſhable; and it is indeed to this irregularly foliaceous ſtructure of the Marcaſites that all their other varieties are originally owing. It is naturally of a fine ſtrong gold yellow, but varies at times into a paler or more intenſe hue, and like the others ſometimes gives the ſeveral rainbow colours in reflection. It is always very bright, but not at all tranſparent.

It gives fire pretty readily with ſteel, but much leſs freely than the former ſpecies.

It makes no effervesſcence with Aqua Fortis.

When put into the fire it ſeldom burſts, but is leiſurely cover'd with a pale blue flame all over its ſurface, which burns a much leſs time than that of the former; and finally it calcines to a very deep purple.

Examin'd by the Microſcope, it appears of a more open foliaceous texture than the former. It is liable to all the accidents of the former, and is found in vaſt quantities in Germany, particularly about the mines in the Hartz Foreſt; in England it is not at all unfrequent, but is leſs common than the former kind.

3. *Marcaſita alba, ponderoſior.*
Heavy, white Marcaſite.

This is a ſpecies of leſs beauty than the other kinds in its more uſual and natural ſtate; it is, however ſubject to various accidents, by means of which it not unfrequently makes a very ſplendid appearance: It is a very firm and ſolid ſubſtance, of a denſe, compact and firm texture, and is conſiderably heavier than any of the other Marcaſites. It is not unfrequently found forming compleat ſtrata of itſelf, and ſometimes, like the reſt, in looſe detach'd nodules; but its more common appearance is in the horizontal cavities of other ſtrata. In theſe it frequently forms a ſort of irregular bed of many yards continuance, and of the depth of the whole cavity, uſually filling it ſo perfectly up, that it has no room to form itſelf into foliaceous ſhoots, or any other protuberances at the edge, but is therefore a plain and ſimple uniform maſs: it is of the ſmootheſt ſurface of any of the Marcaſites, and is ſomewhat ſoft to the touch. It is conſiderably hard, and requires a ſtrong blow to break it; and is of a pale and dead white, like the colour of tarniſh'd pewter, and ſomewhat bright, but much leſs ſo than the other kinds: when broken, it appears at a ſlight view one ſimple uniform maſs, but when more ſtrictly examin'd, is found compos'd of irregular and undulated flakes like the reſt of the Marcaſites; but theſe are more cloſely laid together than in any other ſpecies, and differ from all the reſt, in that when ſtrictly examin'd, they are found to be of an obſcurely ſtriated texture; but this is but here and there diſtinguiſhable by the naked eye, the ridges being in moſt extreamly minute and fine.

It very freely and readily gives fire with ſteel, and gives larger and brighter ſparks than any other body of this Series.

It makes no effervesſcence with acids, and burſts in the fire, burning violently with a deep blue flame of a ſtrong ſulphureous ſcent.

Examin'd by the Microſcope, it is found to be of the very ſame ſtructure with the other Marcaſites, but that its plates are much more cloſely laid together than in any other kind; and theſe are all ſeen to be of a ſtriated or longitudinally ridg'd ſurface. The prominences or ridges are however of extreamly various ſizes, ſome being viſible to the naked eye, many which were undiſtinguiſhable to that, appearing to a ſmall magnifier, and many others requiring one of much greater power.

It is liable to all the varieties and accidents of the firſt kind, but has them much more rarely; it is common in Devonſhire, Cornwal, and many other counties, and lies at all depths, ſometimes in regular ſtrata, ſometimes filling up the horizontal cavities of thoſe of coal, or different ſtones.

Compound inflammable FOSSILS.

CLASS II.

PYRITÆ.

Compound inflammable metallic bodies, found in detach'd maſſes, but of no determinately angular figure.

Of this Claſs there are two Orders, and under thoſe four Genera.

Order the firſt.

Thoſe of a plain and ſimple internal ſtructure.

Order the ſecond.

Thoſe of a regularly ſtriated internal ſtructure.

PYRITÆ.

Order the firſt.

Genus 1. PYRIPLACES. *Pyritæ of a ſimple internal ſtructure, and cover'd with an inveſtient coat or cruſt.*

Genus 2. GYMNOPYRES. *Pyritæ of a ſimple internal ſtructure, and not covered with a cruſt.*

PYRITÆ.

Order the ſecond.

Genus 1. PYRITRICHA. *Pyritæ of a ſimply ſtriated texture.*

Genus 2. PYRITRICHIPHYLA. *Pyritæ whoſe ſtriæ terminate in foliaceous ends.*

PYRITÆ.

CLASS I. ORDER I. GENUS I.

PYRIPLACES.

Pyritæ of a ſimple and uniform, not ſtriated, internal ſtructure, and covered with an inveſtient coat or cruſt.

1. *Pyriplacis compreſſus, cortice ſcabro.*
Flatted Pyriplaces, with a ſcabrous coat.

THIS is a Foſſil of no great beauty, nor indeed carrying any external mark of what it is. It is of a tolerably firm and hard ſtructure, and of a compact, plain and equal texture, and conſiderably heavy. It is of no determinate ſhape or ſize, but is found in maſſes of from one inch to ten in diameter, and of very uneven and irregular edges, but always flat and thin; its moſt common appearance is in maſſes of about four inches long, nearly or wholly of the ſame breadth, and about half an inch in thickneſs. It is conſiderably hard, and requires a ſmart blow to break it; and when broken is ſeen to be of a plain, ſimple, and uniform ſtructure, not compos'd of any viſible Moleculæ, but one homogene maſs of a duſky browniſh green colour, ſurrounded by a cruſt of a duſky ferrugineous matter, very much reſembling the cruſts of ſome of the Siderochita, and like them rough and ſcabrous, and beſet with ſmall pebbles of different ſhapes and ſizes; but for the moſt part little bigger than grains of ſand; theſe ſeem to have been received into the matter of the cruſt while it was yet moiſt, and to have been bedded in it and fix'd in their places as it dry'd.

The cruſt is ever of the colour of ruſty iron, and is in different ſpecimens of very different thickneſſes; in many it is as thick as a wheat-ſtraw, in others as thin as a piece of fine writing paper; but where it is thin it is ever lin'd with a ſort of internal coat of the ſame matter with the nucleus, but uſually a little purer and ſomewhat brighter.

It gives fire with ſteel.

It will not ferment with acid menſtruums.

In the fire it yields a blue flame, which continues but a ſhort time, and the whole afterwards calcines to a deep purple. The Microſcope ſhews it of a very cloſe compact texture.

It is found in the gravel-pits of many parts of England, particularly in great plenty in the neighbourhood of London, as about Tyburn and elſewhere.

2. *Pyriplacis globoſus, cortice rimoſa.*
Globoſe Pyriplacis, with a crack'd coat.

This is a ſpecies of very little more beauty than the precedent, and of a much coarſer ſtructure, being compos'd of very viſible Granulæ. It is very heavy, and of a roundiſh figure, often very perfectly globular, but ſometimes varying from that ſhape, and running into all the uncertainty of figure, which is obſerv'd in the pebble kind. It is of various ſizes, from half an inch to twelve or fourteen inches in diameter, and is moderately hard, requiring a ſmart blow to break it. It is of a coarſe and irregular internal ſtructure, and is plainly ſeen to be compos'd of multitudes of Moleculæ, of flat and ſomewhat gloſſy ſurfaces. It is of a pale colour, ſeeming a mixture of a dead whitiſh green with a duſky browniſh cloud among it. The internal parts of the maſs are uſually of the moſt cloſe and compact texture, and of the duſkieſt colour; the external are more lax, and compos'd of larger Moleculæ, and conſequently more bright and gloſſy. It is cover'd externally with a browniſh yellow, or ferrugineous coat, which is of different thickneſſes from the twentieth part to a third of an inch, and is uſually ſomewhat irregularly rais'd into obtuſe tubercles on the ſuperficies, which are divided by ſhallow lines, which are ſo many cracks in the ſurface; all which, when the body has been ſome time expos'd to a damp air, fly more aſunder at their edges and become deeper, opening into the body of the maſs. In the external appearance of the cruſt, however, there is much variety, ſometimes it has theſe cracks without any tubercles between; and ſometimes, but more rarely, the cracks are ſcarce at all diſcernable till it has lain ſometime expos'd.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

In the fire it gives a ſtrong blue flame, and finally calcines to a purple powder.

Examin'd by the Microſcope, its conſtituent Moleculæ are ſeen to be ſmall, very irregularly ſhap'd, but flatted bodies, laid together with no order or regularity.

It is very common in the chalk-pits of Kent, and in many other parts of the kingdom. It is moſt frequently found immers'd in the ſtrata of chalk, but ſometimes among gravel or looſe on the ſurface.

3. *Pyriplacis compreſſus, cortice craſſiſſimo, albido-fuſco.*
Flatted Pyriplacis, with a very thick, browniſh white cruſt.

This is a very ſingular ſpecies of Pyrites, yet from its unpromiſing appearance has been wholly over-look'd by the enquirers into this part of natural knowledge, being neither deſcrib'd by the writers on theſe ſubjects, nor, ſo far as I can learn, preſerv'd in any of the modern muſeums.

It is an extreamly hard, firm and compact body, of a very cloſe and firm texture, and moderately heavy. It is uſually found much of the ſame ſhape and ſize, but is like the other bodies of this kind, ſubject to ſome variations. It is commonly of a flatted, orbicular, or oval figure, and its moſt frequent ſize is about two inches and a half in length, two inches in breadth, and a little more than an inch in thickneſs; it is of an irregular, uneven and rough ſurface, full of ſmall prominences, and very hard and harſh to the touch, and makes a very unpromiſing appearance, looking merely like a lump of a browniſh clay. It requires a very ſtrong blow to break it, and when broken is found to conſiſt of a Nucleus of the ſame ſhape with the whole body, and every way equally ſurrounded with a cruſt as thick as its whole diameter, or nearly ſo; the cruſt in a ſpecimen of an inch and a quarter thick, being generally one third of an inch in thickneſs. The Nucleus is an extreamly compact, hard and firm ſubſtance, of a deep duſky green, and ſeemingly pure, equal and homogene ſtructure, not compos'd of any viſible Moleculæ. The cruſt is a pale brown, indurated earthy ſubſtance, glittering in ſome few places with ſmall ſhining ſparks, and looking like harden'd clay.

The Nucleus readily gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns to a ſtrong but not deep red; the cruſt burns to a pale brick colour, and ferments ſlightly with Aqua Fortis. This is only owing, however, to a ſmall portion of Spar which it contains; for it is not diſſolv'd, nor its ſtructure broken by that menſtruum.

Examin'd by the Microſcope, it appears a very compact and homogene ſubſtance, and its cruſt of a more lax texture.

I have only met with it in one place, which is a tile clay pit in the brick-field near the end of Grays-Inn-Lane, London. It is there thrown up in conſiderable quantities, and very probably is common enough in other places, though I have happened to paſs it over. The Nucleus in this ſpecies is often naturally crack'd and divided into ſeveral pieces, and the whole is ſometimes of an irregularly oblong figure, with an oblong Nucleus running through its cruſt.

PYRITÆ.

CLASS I. ORDER I. GENUS II.

GYMNOPYRES.

Pyritæ of a ſimple internal ſtructure, and not cover'd with a cruſt.

1. *Gymnopyris varius, vireſcens.*
Green, variouſly ſhap'd Gymnopyris.

THIS is the moſt common of all this ſeries of bodies, and appears to us under the greateſt diverſity of ſhapes of any Foſſil of this kind.

It is a hard, firm, and compact body, of a very cloſe, even and regular texture, and of very great weight. It is of extreamly variable ſhape and ſize, but in its moſt common and natural appearance is a flat body of a variouſly uneven and uſually undulated ſurface, and found in maſſes from half an inch to ten inches, or much more in length. It is often, however, found in irregularly thick maſſes, ſomewhat approaching to the ſhape of Pebbles, ſometimes in very regularly orbicular ones, ſeemingly made up of many plates of a rounded figure laid evenly on one another, and ſometimes in oblong and variouſly protuberant pieces; but its ſurfaces are never very rugged in their natural ſtate. It is cover'd with no coat or cruſt, and is extreamly hard when it has not been expos'd to the injuries of the air; when broken, it appears of a ſimple uniform ſtructure, and of the ſame colour within and without, which is a pale ſilvery green; but at times it varies into all the deeper ſhades of that colour.

It very freely and readily gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It cracks and burſts in the fire, burning with a fine deep blue flame, and finally calcining to a florid red.

Examin'd by the Microſcope, it appears of a finely granulated texture, compos'd of numerous ſmall Moleculæ of a flattiſh figure and gloſſy ſurface.

It is extreamly common in all parts of England, in the ſtrata of blue clay uſually dug for tiles, and in this ſhews itſelf to us in a number of various ſhapes, ſometimes having formed itſelf in the cavities of ſea ſhells, but moſt frequently in the pores of wood, pieces of branches of trees, and old boards, being found in vaſt abundance ſaturated with it. Theſe, however, tho' very common with us, I find are very rare in many other parts of the world.

2. *Gymnopyres Botryoides.*
Botryoide Gymnopyris.

This is a very elegant and beautiful ſpecies; it is of a firm and hard ſtructure, a very cloſe and compact texture, and remarkably heavy; it is very irregular in ſhape and ſize, but is moſt frequently found ſmall and of an oblong form; it is, however, not unfrequently met with, both of this, and of a globular ſhape, of many pounds in weight, and ſometimes in very large irregularly ſhaped flat maſſes; it is uſually quite naked, but ſometimes its outer part ruſts into a ſort of ferrugineous cruſt; it requires a very ſmart blow to break it, and when broken, is found to be more equally uniform and compact in its texture than any other Pyrites, being one even maſs, and reſembling a body of ſome metal; its uſual colour is a very agreeable pale green, tho' it ſometimes varies to a very deep one, but what diſtinguiſhes it from all other Pyritæ is, that its ſurface is ever beautifully elevated into tubercles of various ſizes, and of irregularly roundiſh ſhapes, and ſometimes not only its ſurface, but its whole ſubſtance is thrown into theſe forms, and reſembles a cluſter of grapes hung thick on the bunch, or very exactly a maſs of the fineſt botryoide Hæmatites; it is conſiderably bright where freſh broken, but leſs glittering than the generality of theſe bodies.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis, and put into the fire it burns for a little time with a deep blue flame, cracking and burſting to pieces.

It calcines to a beautiful purple.

Examin'd by the Microſcope, it appears of a very remarkably cloſe and compact texture. It is found in many parts of England, as in Yorkſhire, Devonſhire, and Cornwall, but no where more plentifully than in the high cliffs of the iſland of Sheppey in Kent; as it lies in the clay of the cliff, it is of a fine green, but as vaſt quantities of it are continually waſh'd out thence and ſtrew'd about the ſhore, that which is found there is uſually covered with a ferrugineous coat.

PYRITÆ.

CLASS I. ORDER II. GENUS I.

PYRITRICHA.

Pyritæ of a ſimply ſtriated ſtructure.

1. *Pyritrichum globoſum, ſuperficie irregulari.*
Globoſe Pyritrichum, with an irregular ſurface.

THIS is the moſt common of all the ſpecies of the ſtriated Pyritæ, and is a very elegant body.

It is of a compact and firm ſtructure, and very great weight; it is uſually found in an orbicular form, or nearly ſo, but ſometimes is oblong, ſometimes full of large irregular tubercles on its ſurface, and ſometimes compos'd of ſeveral orbicular maſſes joined together; it is very various in ſize, the more frequent ſpecimens of it being about four or ſix ounces in weight, many leſs than an ounce, and ſeveral of two or three pound; its ſurface is uſually more or leſs irregular, and beſet with tubercles, tho' they are generally broad and depreſs'd, and is often variouſly cut in irregular ſhort lines, and rais'd in ridges, theſe being arrang'd in ſeveral diſtinct Series, and meeting in various angles; it is conſiderably hard, but when broken is ſeen to be of a regularly ſtriated texture; the ſtriæ are not very broad, and run regularly from the center to the circumference; it is of a pale or whitiſh green within, and is covered with a brown or ferrugineous cruſt; it is very bright and glittering when freſh broken.

It freely and readily gives fire with ſteel.

It makes not the leaſt effervefcence with Aqua Fortis, and when put into the fire yields a ſtrong blue flame.

It calcines to a purple powder.

Examin'd by the Microſcope, its ſtriæ appear very irregular and unevenly arranged. It is common in many parts of England in Chalk pits, and ſometimes is found looſe on the ſurface; it is liable to many adventitious admixtures; and thence to ſome variations in its colour, as to a yellowiſh or purpliſh, either thro' the whole ſubſtance or in part only, but theſe ſpecimens are more rare.

2. *Pyritrichum globoſum, tuberculis angulatis obdactum.*
Globoſe Pyritrichum, with angular tubercles.

This is a very beautiful body: it is of a compact, firm and ſtrong texture, and very remarkably heavy; it is found in detached maſſes, from an ounce to a pound or more in weight, uſually of an orbicular figure, or nearly ſo, ſometimes regularly oval, and ſometimes tho' very rarely oblong; it is of a very remarkably rough ſurface, which Dr. Woodward has called echinated, and compared to that of the echinated, cryſtalline and ſparry balls; but the name is much leſs proper to this body than to thoſe, ſince their points are all ſharp, and thoſe of the tubercles of this body are ever very obtuſe and blunt; it is externally of ruſt colour, or ferrugineous brown, and is covered all over its ſurface with ſhort quadrangular pyramids, with very broad baſes and blunt points; theſe ſometimes incline a little, but uſually they ſtand very erect, and are placed ſo cloſely one to another, as to crowd one another at their baſes; it requires a very ſmart blow to break it, and it is then found to be of a more or leſs regularly ſtriated ſtructure within: the ſeveral ſtriæ being very broad, and ſomewhat irregularly ſhaped, and lying ſomewhat unevenly on one another; it is of a greeniſh colour, uſually with ſome admixture of yellow, and ſeldom very deep or duſky, but it has no admixture of whiteneſs, it is very bright and glittering.

It freely and readily gives fire with ſteel.

It will not ferment with Aqua Fortis.

It is very readily inflammable, burſting to pieces in the fire, and yielding a deep blue flame, with a very ſtrong ſulphureous ſcent.

It calcines to a fine deep purple.

Examin'd by the Microſcope, its ſtructure is ſeen to be extreamly irregular, and its ſtriæ of very different breadths and thickneſſes, but uſually they may be ſeen to cohere very firmly together.

It is common in many parts of England, and in moſt other parts of Europe; it is uſually found in ſtrata of Chalk, and ſometimes on the ſurface of the earth.

3. *Pyritrichum globoſum, argenteum, ſuperficie lævi.*
Silver-colour'd, globoſe Pyritrichum, with a ſmooth ſurface.

This is an extreamly elegant and beautiful Foſſil; it is of a moderately firm and compact texture, and very remarkably heavy; it is found in looſe detach'd maſſes, uſually of a very regularly globular form, and very ſeldom departing from that figure, tho' ſometimes liable to the ſame change of ſhape with the other bodies of this Genus; its uſual ſize is about an inch and half diameter, but it is ſometimes found of the ſize of a ſmall nut, or ſchool-boys marble, and ſometimes of more than two pound in weight; its ſurface is uſually very ſmooth and equal; it is always free from thoſe tubercles and ridges to which the former ſpecies are ſubject, and when it has any inequalities, they are uſually only a number of ſmall irregular depreſſions;

preſſions; it is covered with no coat or cruſt, but its ſurface is of the ſame colour with its internal parts, only leſs bright; it breaks with a ſmall blow, and is ſeen when broken to be of a very regularly and evenly ſtriated texture, and a beautiful pale ſilvery green colour; the ſtriæ are moderately broad, and run with great evenneſs from the center to the circumference; but not unfrequently the central part of the body is a very firm and ſolid Nucleus, of the ſize of a horſe-bean, of a plain uniform ſtructure, and not ſtriated; it is extreamly bright and glittering when freſh broken, and is a very beautiful object.

It very freely and readily gives fire with ſteel.

It will not at all ferment with Aqua Fortis, and put into the fire it burſts, and yields a blue flame, with a very ſtrongly ſulphureous ſmell.

It calcines at laſt to a deep purple powder.

Examin'd by the Microſcope, it is ſeen to be of the moſt evenly ſtriated texture of all the bodies of this Genus.

It is found in ſome parts of Eſſex and of Hampſhire, and is very common in the mountainous parts of Germany.

Compound inflammable FOSSILS.

CLASS I. ORDER II. GENUS II.

PYRITRICHIPHYLA.

Pyritæ of a ſtriated texture, whoſe ſtriæ terminate in foliaceous ends.

1. *Pyritrichiphylum, ſuperficie foliacea.*
Pyritrichiphylum, with a foliaceous ſuperficies.

THIS is a body ſecond to none of the Pyritæ in beauty: it is very firm and compact, of a cloſe but uneven and irregular texture, and very heavy; it is found in maſſes of various ſhapes, but moſt frequently orbicular, or ſomewhat approaching to that figure, tho' ſometimes longiſh, ſometimes flat, or variouſly bent, and ſometimes of perfectly irregular forms; its globular or pebble like appearance is, however, is moſt frequent; and not much leſs common is it to find it in ſhape of the half of ſuch a body, as if it had been accidentally broken. In both theſe figures the maſs is ſometimes wholly compos'd of the matter of the Pyrites, but more frequently it is only a thick cruſt of that matter ſurrounding ſome other ſubſtance, ſtony metalline or other. It is found of various ſizes, but uſually large, there are pieces met with perfect indeed of not more than two inches diameter, but thoſe of ſix or eight inches are much more frequent, and I have ſeen of them of more than two foot; it is of a very elegant ſurface, though remarkably rough and unequal; it is harder than almoſt any other of the Pyritæ, but when broken is found to be of an irregularly but very cloſely ſtriated texture; the ſtriæ are broad, but unequally ſo, and their extremities at the ſurface are form'd into ſeveral Series of thin foliaceous plates, which cover the whole ſuperficies of the body in ſmall ſeries, ſtanding at unequal heights, and in different angles, but moſtly leaning one way, they are of unequal thickneſſes, being compos'd of different numbers of flakes, and are uſually notched at their ends. It is of a ſomewhat deep and duſky green colour, but where freſh broken is very bright and glittering.

It freely and readily gives fire with ſteel.

It will not ferment with Aqua Fortis.

It burſts in the fire, and emits a deep blue flame, calcining afterwards to a purple powder.

It is found in vaſt plenty in the great mine at Goſſelaer in Saxony, and in many of thoſe of the Hartz foreſt in Germany, nor is uncommon in England. I have ſeen much of it on Mendip Hills in Somerſetſhire, and it is not uncommon in Derbyſhire and Cornwall.

2. *Pyritrichiphyllum, ſuperficie glabra.*
Pyritrichiphyllum, with a ſmooth ſuperficies.

This is a Foſſil of equal beauty with the former; tho' of a very different appearance; it is very firm and compact, and of a cloſe and very even and regular texture, and remarkably heavy; it is found in detached maſſes of a very ſingular kind, being always more or leſs hollow; the maſſes are of various figures, often emulating the ſhape of Pebbles, but much more frequently the rugged and knobby appearance of our flints in chalkpits, and ſometimes they run along the ſides of large ſtones in form of cruſts variouſly protuberant in ſeveral parts, and riſing into beautiful tho' irregular tubercles; the detach'd maſſes are ſeldom ſmall, five or ſix inches in diameter being a middle ſize, and they often are of more than a foot.

The outer ſurface of this body is ever very perfectly ſleek and gloſſy, and that even on the greater part of the tubercles themſelves as if wrought by art; it is very hard, but when broken, appears of a very regularly and evenly ſtriated texture, and always more or leſs hollow, often having ſeveral irregular cavities, and ſeldom forming any where a cruſt of more than half an inch thick, uſually not of half that thickneſs; its ſtriæ are narrower than in moſt other Pyritæ, and tho' at the outer ſurface they form a very even ſuperficies, yet every where in the inner one their ends are extended into beautiful foliaceous plates ſomewhat approaching to a ſquare figure, and not ſtanding erect as in the former ſpecies, but lying horizontally on one another; they are arranged into ſeveral ſeries, and are compos'd of plates not thicker than thoſe of the foliaceous Talcs; the general body of the maſs is of a greeniſh hue, but where broken into theſe plates, it is uſually of a yellow colour, and very bright and beautiful.

It freely gives fire with ſteel.

It will not ferment with Aqua Fortis, and put into the fire burſts and flies to pieces, yielding a deep blue flame, of a very offenſive ſmell, and finally calcining to a fine florid red.

Examin'd by the Microſcope, its ſtructure appears extreamly cloſe, even and fine, and its plates compos'd of innumerable thin flakes.

It is found on Mendip Hills in Somerſetſhire, and no where elſe that I know of; I met with large quantities of it there in ſeveral places where they were ſinking for Coal.

Compound inflammable FOSSILS.

CLASS III.

PHLOGONIÆ.

Compound, inflammable, metallick bodies, found in ſmall maſſes, of determinately angular figures.

Of this Claſs of bodies there are three Genera.

Genus 1. PYRICUBIA. *Phlogoniæ, of a regularly cubic figure, or compos'd of ſix planes.*

Genus 2. PYROCTOGONIA. *Phlogoniæ, of an octohaedral figure, or compos'd of eight planes.*

Genus 3. PYRIPOLYGONIA. *Phlogoniæ, of a dodecahaedral figure, or compos'd of twelve planes.*

CLASS III. GENUS I.

PYRICUBIA.

Compound, inflammable, metallic bodies of a cubic figure, or compound of ſix ſides.

1. *Pyricubium maximum foliaceum.*
The larger foliaceous Pyricubium.

THIS is a very ſingular and elegant Foſſil: and is of ſo bright an external appearance and regular a ſhape, that it has been by many miſtaken for a body wrought by art.

It is of a moderately firm ſtructure, and elegant and regular, foliaceous texture, and is very heavy. It is ever found in a regular cubic form, compos'd of ſix perfectly ſmooth and even ſides plac'd at right angles; but tho' ever thus regular in ſhape, it is not at all ſo in ſize. The more frequent ſpecimens of it are of about one third of an inch in diameter, but it is found in ſome of not a tenth part of an inch, and of all the intermediate ſizes between that and three inches, nay ſome have been found much exceeding even that ſtandard. It is every way of a perfectly ſmooth and even ſurface, very ſoft to the touch, and is moderately hard, but breaks equally in all directions, being plated in the direction of all the ſurfaces, as the parallellopiped Spars, and ſome other of the bodies of that kind. It is very bright and gloſſy both on its natural ſurface, and whereever freſh broken; and is ſeen to be compos'd of numerous plates, as thin as thoſe of the foliaceous Talcs. It is of a very beautiful whitiſh green, with a faint admixture of yellow.

It gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

It burns with a deep blue flame and ſtrong ſulphureous ſmell, calcining finally to a deep purple.

Examin'd by the Microſcope, its conſtituent plates are ſeen to be very thin, and their arrangement exactly the ſame as in the parallellopiped Spars. It is found in ſeveral of the German Mines, in the gold mines of Cremintz in Hungary, and in many parts of the Eaſt-Indies.

2. *Pyricubium ſolidum minus.*
The ſmaller ſolid Pyricubium.

This in its external ſhape and appearance very much approaches to the former ſpecies, but is extremely different in its ſtructure.

It is a very firm and hard body, of a cloſe, uniform, and compact texture, and very heavy. It is of a determinate figure, being always found in form of a cube, or body made up of ſix flat ſides placed at right angles; but tho' thus regular in ſhape, it is very different in ſize; its moſt uſual appearance is in maſſes of about an eighth of an inch in diameter, but it is alſo found at times ſmaller than the larger ſort of pins heads, and from this to three quarters of an inch in diameter. This is the largeſt ſize I have ever had accounts of; and it is indeed very rarely that it exceeds a third of an inch. It is perfectly ſmooth, even and polite on all its ſurfaces, and is conſiderably hard; when broken it is found to be of an even, plain and uniform ſtructure, and is very bright and gloſſy. It is uſually of a pale yellowiſh green, and as bright on the ſurface as in the inner part; but from this it ſometimes deviates, being found, eſpecially in the large ſpecimens, often of an opake and duſky ſurface, and of a ferrugineous or ruſt colour. This is an accidental variety that the botryoide Pyritæ alſo, and many other bodies of this claſs are ſometimes liable to; and neither in thoſe nor in this makes any eſſential differences in the body; theſe when broken being found as bright and of as pure a colour as thoſe whoſe external ſurfaces are ſhining and polite.

It very freely gives fire with ſteel.

It will not at all ferment with Aqua Fortis.

When put into the fire it cracks and burſts, and burns with a deep blue flame finally calcining to a fine florid red. It is very common in the northern counties of England,

and in Germany, Italy, and ſeveral parts of America. With us it is uſually found immers'd in the common black ſlate, with which houſes are cover'd; but in Germany and moſt other places, it is found looſe among the earth of the mountains. There it is generally of a ferrugineous ſurface, with us it is more commonly bright.

Compound inflammable FOSSILS.

CLASS III. GENUS II.

PYROCTOGONIA.

Pyritæ of an octohaedral figure, or compos'd of eight planes.

Pyroctogonium lucidum varium.
Bright varying Pyroctogonum.

THIS is a very ſingular and beautiful Foſſil; it is conſiderably firm and compact, and of a cloſe and tolerably even texture, and very heavy.

It is of a determinate and regular figure, being always compos'd of eight triangular planes, theſe being the ſides of two quadrilateral pyramids with broad baſes, join'd at their baſes one to another. This is ever determinate and certain in the perfect ſpecimens of this Foſſil; but there is ſcarce any ſpecies of Foſſils more ſubject than this to variations and irregularities. Its moſt perfect ſhape is when theſe two pyramids are plac'd evenly one againſt the other; but this is very ſeldom the caſe, they are often ſet very unevenly and ſlanting; their planes are frequently of very irregular lengths and breadths, and not unfrequently the ſpecimens are found mutilated and imperfect, and very often cohering one with another in various manners, and extreamly injuring one anothers figure. They are of very various ſizes, from the bigneſs of a large pin's head to that of a large walnut, but their moſt frequent ſize is about an eighth of an inch in length; they are naturally of very ſmooth and gloſſy ſurfaces, and of the colour of poliſh'd iron: They are conſiderably hard, and when broken appear very bright and ſparkling, and often of a much paler colour than on their outer ſurface. They are not of a regular uniform ſtructure within, like the former ſpecies, but are compos'd like the Marcaſites, of a looſely and irregularly arrang'd multitude of thin undulated flakes; but in theſe bodies the plates are laid much more cloſely together, and the ſtructure is more compact than in the Marcaſites.

It very freely gives fire with ſteel.

It refuſes to ferment with Acids.

When put into the fire it cracks and burſts, yielding a blue flame of a ſulphureous ſmell, and finally calcining to a deep purple.

Examin'd by the Microſcope, the plates it is compos'd of are found to be very thin and finely join'd together, though variouſly undulated and bent.

It is found in ſome parts of Cornwall, ſometimes in Devonſhire, and very frequently in North America. It is ſometimes met with looſe in the ſtrata of earth, and ſometimes lodg'd in the Marcaſites, and varies frequently from its iron colour to a duſky yellow. It is not unfrequently found alſo concreted into large maſſes, compos'd of multitudes of ſmaller or larger ſpecimens, ſeldom at all uniform in ſize even in the ſame maſs, and variouſly cohering together, and injuring one another's figure. Sometimes alſo, as in Cryſtals, they form a large maſs, of which the outer part only is ſhot into regular figures, the inner being a confus'd ſubſtance. Maſſes of this kind are not unfrequently found very regularly orbicular, and beſet all over with the regularly angular bodies in various directions, and of various ſizes.

Pyriplacis Sp.1.

Pyriplacis Sp.2.

Pyriplacis Sp.3.

Gymnopyris Sp.1.

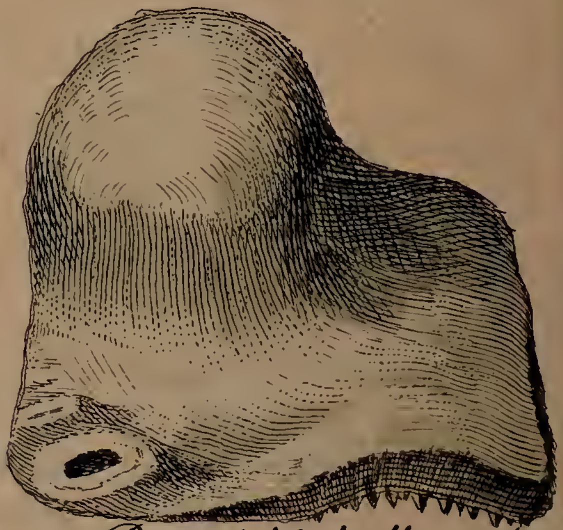
Gymnopyris Sp.2.

Pyritrichum Sp.1

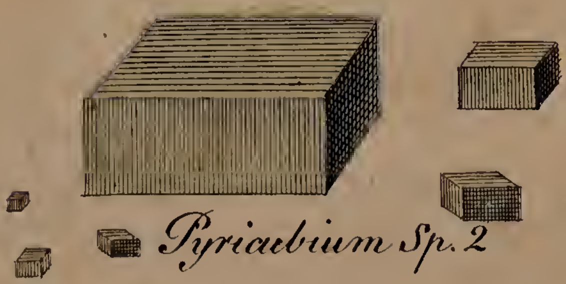
Pyritrichum Sp.2.

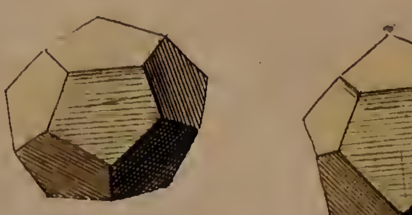
Pyritrichum Sp.3.

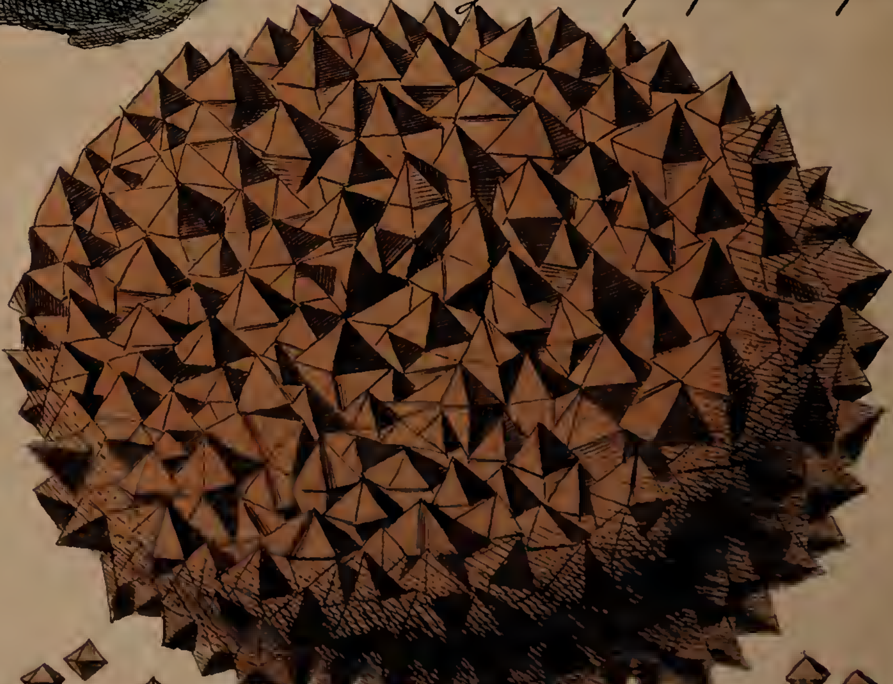
Pyritrichiphyllum Sp.1.


Pyritrichiphyllum Sp.2

Pyricubium Sp.1


Pyricubium Sp.2


Pyripolygonium


Pyroctogonium Sp.1

B. Cole Sculp.

Compound inflammable FOSSILS.

CLASS III. GENUS III.

PYRIPOLYGONIA.

Pyritæ of a regular figure, conſiſting of twelve planes.

Pyripolygonium lucidum, durum.
Hard, ſhining Pyripolygonium.

THIS when perfect is an extreamly beautiful body, but that is a ſtate it is but rarely found in. It is moderately firm, of a regular and compact texture, and very heavy. Its natural figure is a dodecahedron, or body compos'd of twelve planes, but it is ſubject to great irregularities, and often ſeems to want one or more of its ſides, and very frequently has ſmaller bodies of its own kind, but more imperfect, growing faſt to it, which give it a very great irregularity in its external appearance. It is very various in ſize, being found from the twentieth of an inch to four inches in diameter; but its moſt frequent bigneſs is about the third of an inch. It is every way of a ſmooth and ſhining ſurface, and naturally of a pale yellow, but ſometimes of a ruſt colour, and ſometimes of that of poliſh'd ſteel. It is conſiderably hard, but when broken is found to be of a foliaceous ſtructure, being every where made up of very thin and variouſly arrang'd plates, one ſuch plate every where making the ſurface of each of the planes; theſe are often diſtinguiſhable to the naked eye, but ſometimes they are ſo fine and ſo nicely join'd, as to require the aſſiſtance of the Microſcope.

It very freely gives fire with ſteel.

It will not ferment with Aqua Fortis.

When put into the fire yields a blue flame with a ſulphureous ſmell, and finally calcines to a blueiſh purple.

It is found in many of the mines of Cornwall, but is much more frequent in Germany, and in the Eaſt and Weſt Indies. It is ſometimes found ſingle and perfect, but much more frequently is mutilated in its figure, or found in ſmall cluſters, and ſometimes like the former, in large and ſolid balls, of an orbicular figure, and of a ſhapeleſs ſtructure within, only cover'd on the ſurface with parts of theſe regularly figur'd bodies. Theſe, among the almoſt infinite varieties of theſe bodies, ſeem to be all the truly diſtinct Marcaſites and Pyritæ yet known. They all agree in their general compoſition and uſes, but are ſubject to contain often great quantities of extraneous matter. They are all compos'd of ſulphur, iron and earth, and their ſulphur acting on the iron, when aſſiſted by the air or water, produces Vitriol in great abundance; but beſides theſe conſtituent parts, they often contain the other metals, but of theſe moſt uſually copper, and often large quantities of arſenic may be ſeparated from them.

They are of great uſe both to the medicinal and mechanic part of the world, as almoſt all the Vitriol and Sulphur we have among us are ſeparated from them. The Sulphur is prepar'd in vaſt quantities in many parts of Germany from the ſeveral Marcaſites and Pyritæ, and the Vitriol commonly call'd Copperas, by our artificers, from the ſame boil'd with fragments of old iron after it has lain long expos'd to the air. The common Foſſil wood impregnated with the matter of the Pyrites, is what is commonly us'd on this occaſion, as it is produc'd with us in vaſt abundance; great quantities of this are daily collected on the ſhores of the iſland of Sheppy, which are waſh'd out of the cliffs by the ſea, and then ſcattered about the ſhore.

THE
HISTORY
OF
FOSSILS.

PART the THIRD.

BOOK I.

Metallic FOSSILS.

ASPHURELATA.

METALLIC Foſſils fuſible by fire, and not malleable in their pureſt ſtate.

Theſe are all in their native ſtate penetrated by and intimately mix'd with ſulphur and other adventitious matter, and reduc'd to what are call'd ores.

Of this ſeries of Foſſils there are only five bodies, all naturally comprehended in the ſame Claſs, but each making a ſeparate and diſtinct Genus.

Theſe are Antimony, Biſmuth, Cobalt, Zinck, and Quickſilver.

ASPHURELATA.

GENUS I.

Antimonium.
Antimony.

This is a mineral body never found native in its pure ſtate, but always intimately mix'd with and penetrated by ſulphur and other extraneous matter, and reduc'd to the form of an ore. In this mix'd ſtate it is ever found in the earth, and according to the different proportions of ſulphur or admixture of other bodies, it is found in ſeveral forms.

Its moſt uſual appearance is in a very hard and heavy lead colour'd ſubſtance, compos'd of a number of extreamly ſmall Granules, all very bright and ſparkling, and giving it the appearance of a lump of the pureſt ſteel where freſh broken. This is what is commonly underſtood by the name Antimony ore.

Not unfrequently however it appears of a ſomewhat more lax texture, leſs heavy, but much more bright, and compos'd of ſmall, but viſibly broad and flat particles, of a very pale whitiſh lead colour and glittering appearance, like that of many of the lead ores. This ſome have call'd the broad-grain'd antimony ore.

Sometimes alſo, but leſs frequently, it appears in form of extremely bright maſſes, made up of multitudes of parallel ſlender filaments of a bright ſteel colour, and more glittering hue than in either of the former ſtates; theſe filaments are of different breadths and thickneſſes in the ſeveral maſſes: and theſe are generally known by the names of ſtriated or plumoſe antimony ore.

Theſe are the moſt natural and ſimple appearances of this Foſſil, but beſide theſe, it is liable to a multitude of other very different ones, as it ſometimes truly contains iron mix'd among its own matter, and very frequently ſilver; theſe may very naturally be ſuppos'd to give it ſome difference in appearance; but beſide theſe, it is ſubject to admixtures of the matter of the common Marcaſites or Pyritæ, and is thence often ting'd to a fine ſilvery white, or a ſtrong gold yellow.

It is found in fiſſures and veins at different depths, and not unfrequently very near the ſurface. According to the bodies it here lies among, it is variouſly accompany'd with Spars, Cryſtals, Sulphurs, and other ſubſtances; ſometimes the veins of it are every way ſurrounded and cover'd with a tolerably pure yellow ſulphur; ſometimes with a more debas'd matter made of mixtures of ſulphur, earth and ſpar, differing according to the different diſpoſition and admixture of theſe bodies. The various maſſes of antimony ore make a very different appearance, and are no ſmall ornaments by their variety to the cabinets of the curious. In the catalogues of ſuch collections, theſe alſo uſually help to make up the number of what are call'd, the different ſpecies of Foſſils. It would be unpardonable, however, to treat of them as ſuch, in a work of this nature, where we cannot even allow the three differences of the common or granulated, the flaky and ſtriated ore of this mineral as diſtinct ſpecies; they being all compos'd of the ſame matter, and like the other varieties of Foſſils of the ſame conſtitution, often all found in the ſame lump, and plainly degenerating into one another.

As the ores of every metal and mineral, are alſo no other than the particles of that peculiar body immers'd in various admixtures of other Foſſils; it would be no leſs abſurd to deſcribe thoſe things again, which have been already deſcrib'd in the courſe of the work; and the combinations of which, in ores are ſo various, as to be almoſt different in every ſpecimen. We can only ſuppoſe then, that the particles of the metal or mineral embodied in that ore, are the proper ſubjects of enquiry here, and can have no buſineſs with the reſt but in regard to the various general figures they give the ore, which are neceſſary to be mention'd that it may be known.

Antimony is found in England and Germany in great abundance; we have ſeveral mines of it in Cornwall, the gold mines of Chremnitz in Hungary afford it, and many other places in Hungary and Tranſylvania; nor is it uncommon in many other parts of the world.

To bring it to uſe, it is to be ſeparated by fuſion out of its ſtate of ore, which is done by the force of fire, and the addition of ſuch ingredients as break the mutual connection between the ſulphureous and reguline part, which mutually diſſolving each other, keep the concretion in ſtate of an ore; the addition of iron alone will do this, and the mixture of copper, ſilver, and many other bodies, has the ſame effect.

There have not been wanting perſons, who pretend to be able to extract a pure running Mercury from Antimony, and Mr. Boyle believed it might be done; but this is one of the many things pretended to by the Alchymiſts, of which we have no ſufficient proofs.

Antimony when ſeparated from its ore is very eaſily fuſible, and runs the thinneſt of all the bodies of this kind; it promotes the fuſion of other Foſſils, but makes every thing brittle that it is mixt with. It is of great uſe in medicine, chymiſtry, and mechanicks. It is in its ſeveral preparations diaphoretic, cathartic and emetic; the chemiſts uſe it greatly in their operations on other metals, and it is an ingredient in pewter, bell-metal, and the mixt metal of which the types for printing are made.

ASPHURELATA.

Genus II.

Biſmuthum.
Biſmuth.

Biſmuth is a mineral body ſometimes, tho' very rarely found native. Its moſt uſual appearance is in form of an ore, into which it is reduced by its particles being penetrated by, and intimately mixt with a ſulphur and a large quantity of arſenic, and with an earthy matter, which yields a blue colour equal to the Zaffar or Smalt produced from Cobalt. In the fuſion of this ore the ſulphur and arſenic evaporate over the fire, and the reguline matter being then freed from its impriſon'd ſtate, runs off from the earthy ſubſtance which remains fixed behind, which may, with the addition of flints and a fixt alkali, be run to the fine blue glaſſy matter call'd Smalt.

Native Biſmuth is found in ſmall compact maſſes, of a pale lead colour on the outſide, and when broken of a fine glittering ſilvery white, and compos'd of multitudes of foliaceous flakes, or plates laid evenly over one another, and diſpos'd in ſeveral irregular ſituations in the maſs.

In the ſtate of ore it is uſually of a bright ſilvery white, and of an obſcurely and irregular foliaceous ſtructure; ſometimes it appears granulated, and at others the Granules are large, and the maſſes coarſe; in which caſe, every ſeparate Granule appears of a cubic form. It is ſubject to fewer variations in its ore than moſt other minerals, but is ſometimes turn'd yellow by an over proportion of ſulphur, and ſometimes is very deeply ting'd with the matter of the common Marcaſite, and is often miſtaken for mere Marcaſite, by many; it is found in great abundance in Germany, and is not uncommon in England. The tin mines of Cornwall afford great quantities of it, tho' it is very little known there.

Biſmuth is eaſily ſeparable from its ore, and may be procur'd pure by merely melting the ore alone in a crucible in a moderate fire; when it is in a more impure ſtate, it is eaſily procur'd by an addition of the common black flux of the Metallurgiſts, which is only a mixture of one part nitre, and two parts crude tartar, melted together into a black maſs; but with this addition, the fire muſt not be too fierce, for if it be the Biſmuth will be loſt. The Regulus of Biſmuth is like the native Biſmuth, compos'd of ſeveral irregular arrangements of very thin plates, like thoſe of many of the Spars; and each plate as in thoſe bodies, is made up of regularly ſhap'd Granules approaching to a cubic figure. It is very bright and ſhining, and of a ſilver like white, but eaſily tarniſhes and acquires a pale yellow.

Biſmuth attenuates the parts of all other metals by mixture, rendering them much more eaſily fuſible, and much more fit for amalgamation with Mercury, the Mercury taking up a much larger quantity of them, and carrying them more eaſily with it, through leather. It is ſoluble in vinegar like lead, and the ſalt to be produced from it reſembles that of lead in its ſweet taſte; diſſolv'd in ſtronger acids it yields the famous Coſmetic Magiſtery, and is a very valuable mixture in the metal for caſting types for printing, and for bell-metal.

Genus III.

ASPHURELATA.

Cobaltum.
Cobalt.

This is a mineral, a perfect knowledge of which has been but very lately obtained, and from which all the artificial poiſons call'd arſenics are produced.

It is a denſe, compact, and ponderous mineral, very bright and ſhining, and much reſembling ſome of the antimonial ores.

It is ſometimes found of a deep duſky blueiſh black, very heavy and hard, and of a granulated ſtructure, looking like a piece of pure iron where freſh broken; at other times it is found more compact and heavy, and of a very even texture, not granulated or compos'd of any ſeparate Moleculæ, but reſembling a duſky maſs of melted lead on the ſurface, not an ore. The inner part, where it is always very bright when freſh cut or broken, is alſo found in ſome places in a much more beautiful appearance than either of theſe, being of a fine bright ſilver grey, and of a beautifully ſtriated texture, the ſtriæ all running great lengths, but being very ſlender and variouſly bent, and undulated, and in ſome parts broken. Theſe are the more ordinary appearances of Cobalt, but beſide theſe it is ſubject to an alteration in the bowels of the earth, by means of ſubterranean fires and ſulphur, which reduce it to a body, by no means at firſt ſight to be ſuppoſed the ſame with the common Cobalt, tho' appearing perfectly ſo on a chymical analyſis.

In theſe ſtates, inſtead of the lead like appearance of the common kind, it is of a fine florid red, tho' ſometimes debas'd by accidental mixtures of grey, black, or yellow, and in this ſtate has two ſubordinate diſtinctions, appearing ſometimes in form of a compact maſs, of an even uniform texture, and ſometimes in a ſtriated and beautifully ridg'd maſs, reſembling ſome of the coarſer Fibrariæ.

The three firſt ſtates of the Cobalt, are commonly call'd by the name Cobalt ore, without any diſtinction; but the firſt of theſe red kinds is call'd Kupffer Nicol, and the latter, or ſtriated one, the flower of Cobalt.

It is found in Germany, Saxony, Bohemia, and England. Ours is a very poor kind, but I have met with it in many places on Mendip-Hills, where they have been ſinking for other things. The German commonly contains a large quantity of Biſmuth, and the Bohemian of ſilver.

The world is oblig'd to Kunkel for the hiſtory of the ſeveral Arſenics, Zaffre and Smalt, which are the produce of Cobalt.

The Cobalt is roaſted in a reverberatory furnace, and the flowers it yields are collected in form of ſoot; and from theſe flowers are made the ſeveral ſorts of Arſenic or Rats-bane; if they are only reſublim'd, or but barely melted in a cover'd veſſel, they become what we call white Arſenic; if a tenth part of ſulphur be mix'd with them and they are ſublimed together, the product is our yellow Arſenic, and the red Arſenic is made by ſubliming them with one fifth ſulphur, and a little copper ſlag.

When theſe flowers are all diſcharg'd, the remaining matter is powder'd very fine, and mix'd with three times its weight of powder'd flints, and being wetted with common water, the whole concretes into a ſolid maſs, and is what is call'd Zaffre.

Two parts of it being fus'd with three parts common ſalt, and one part pot-aſh, run into the beautiful blue ſubſtance call'd Smalt.

The ſprinkling the powders of the calx of Cobalt and Flints for the making them into Zaffre, giving them a pretty firm coaleſcence, and even the hardneſs of a common ſtone. Perſons who were unacquainted with the proceſs, have taken Zaffre for a native mineral, an error that has given me on another occaſion ſome trouble; and which I find was not a peculiar miſtake in the gentleman who objected it to me, but the ingenious Cramer, an author to whom I am oblig'd for many things relating to the properties of metals, has mention'd it as a common and prevailing one.

ASPHURELATA.

GENUS IV.

Zinctum, cujus minera Lapis Calaminaris.
Zinck, the ore of which is called Lapis Calaminaris.

Zinck is a very remarkable mineral, and one which has been very little underſtood as to its origin till of late, for tho' the world well knew both Zinck and Lapis Calaminaris, and knew that both had the remarkable property of turning copper into braſs, which one would have thought might have given the hint to a diſcovery of the truth in regard to them; yet they have been treated of, as two very different ſubſtances by the writers on theſe ſubjects; and that excellent Metallurgiſt, the late Dr. Iſaac Lawſon, (to whoſe memory it is not eaſy to do juſtice, even in the warmeſt praiſes, and whoſe late loſs cannot be remember'd without a tear by all who are engag'd in theſe ſtudies;) was the firſt who publickly declar'd and prov'd Lapis Calaminaris to be the ore of Zinck. Zinck is generally confounded with Biſmuth, tho' in reality a perfectly different body; but the Regulus of theſe two minerals having a very great external reſemblance, the vulgar have not diſtinguiſh'd them; and hence we hear of many ores of Zinck, which only mean ores of Biſmuth.

Lapis Calaminaris, the general ore of Zinck, is a ſpungy ſubſtance of a lax and cavernous texture, yet conſiderably heavy. It is of no determinate ſhape or ſize, but is found in maſſes of very various and irregular figures, with rugged, uneven, and protuberant ſurfaces, from an ounce to ten or twelve pound in weight, and ſometimes much more than that. It is when moſt pure and perfect, of a pale browniſh grey, but its lax and ſpungy textures makes it very liable to be foul'd by extraneous matter, and thence it is often found yellow or reddiſh.

It is moderately hard, but will not give fire with ſteel.

It will not ferment with Aqua Fortis.

It calcines in a ſmall fire to a pale red.

Examin'd by the Microſcope, it is ſeen to be of a very coarſe ſtructure, and uſually ſpangled with ſmall ſparks of a cryſtalline matter.

Tho' this ſubſtance is the true and genuine ore of Zinck, yet that mineral is not confin'd to this alone, but is mix'd in great abundance in its diſſeminated particles among the matter of the ores of other metals, particularly of lead.

Our artificers have long been acquainted with Zinck under the name of Spelter; but no one has been able till of late, to make any gueſs at what was its origin; and ſome very accurate Metallurgiſts publickly acknowledge, that they have every where ſearch'd after the ore of Zinck in vain, particularly in England. We have much brought alſo from the Eaſt-Indies, under the name of Tutenag, yet no body ever knew from what, or how it was produced there; and all that was heretofore known of it was, that among that ſtrange mixture of ores at Goſſelaer in Saxony, when fus'd for other metals, a large quantity of Zinck was produced; but the great Metallurgiſt before nam'd, obſerving that the flowers of Lapis Calaminaris were the very ſame with thoſe of Zinck, and that its effects on copper were alſo the ſame with thoſe of that metal, never ceas'd his endeavours till he found the method of ſeparating pure Zinck from that ore.

The pure Zinck is a ſolid metal-like body, of a blueiſh white, and ſomewhat leſs brittle than Biſmuth, particularly when gently heated, and moſt of all the metallic minerals approaches to malleability; it melts in a very ſmall fire, and in a fierce one takes fire, burning with a blueiſh green flame, and ſubliming into white flowers, which are very difficultly reducible again into the form of Zinck: in an open fire it flies all off.

Lapis Calaminaris is much us'd in medicine, externally in Cerates for burns, and in Collyriums for the eyes; its reguline matter ſerves much better for the purpoſe of turning copper into braſs than the crude ore, and is us'd with leſs trouble.

There is great reaſon to believe, that all the Zinck or Tutenag brought from the Eaſt-Indies is procured from Calamine, and we have now on foot at home a work eſtabliſhed by the great diſcoverer of this ore, which will probably very ſoon make it unneceſſary to bring any Zinck from elſewhere into England.

ASPHURELATA.

GENUS V.

Hydrargyrum, cujus minera Cinnabaris Nativa. *Quickſilver, of which Native Cinnabar is an Ore.*

Tho' the procuring Zinck from an ore ſo little reſembling that body in its purer ſtate, was reſerved for a diſcovery of very late date, yet the procuring Quickſilver from Cinnabar, an ore much more unlike that fluid ſubſtance, was known to the earlieſt ages we have any certain accounts of.

Quickſilver is, however, very frequently found native, ſometimes lying in large quantities together in the accidental cavities of ſtone, and running out in a ſtream as the miners break them; this, however, is leſs frequent; its more common appearance being in ſmall parcels, and often in ſingle globules, ſometimes ſcarce large enough to be well ſeen by the naked eye, lodg'd in great abundance in the pores of a ſoft fiſſile ſtone, of a pale blueiſh colour; from which it is eaſily ſeparated by pounding and waſhing; it is alſo lodg'd in the ſame manner in ſeveral of the harder ſtones, and in various ſpecies of Earths.

Tho' Quickſilver be, however, frequently found native, yet we meet with it yet more commonly in the form of ore, its particles being penetrated by and intimately mixed with ſulphur, ſo as by no means to be known by the eye for Quickſilver; it has been before obſerved, that ſulphur thus penetrating and blending itſelf with the particles of metals, is what reduces them to a ſtate of ore; but here we have an unqueſtionable proof of this, as we are able by an admixture of ſulphur with crude native Quickſilver, to make an ore perfectly like the natural one.

The moſt common ore of Quickſilver, is the Foſſil we know under the name of native Cinnabar; a moderately compact, and firm ſubſtance, very heavy, of a fine and elegant red, and a ſtriated texture; the ſtriæ according to the proportion of the ſulphur, in the concrete, being more or leſs broad and viſible; this is ſo rich an ore, that it is properly no other than Mercury impregnated with a ſmall quantity of ſulphur, juſt enough to reduce it to that ſtate, being more than ſix parts Mercury to one of Sulphur in the richeſt ſpecimens, and in the pooreſt yielding near half; it is of a very bright and glittering appearance when freſh broken, and is ſometimes found in large and pure maſſes, and ſometimes in ſmall ſpangles, lodg'd in Earths or Stones; theſe are ſometimes ſeparate, and of little value, at others they are lodg'd in large congeries, and are then ſeparated by pounding and waſhing, and are very valuable; the Cinnabar is uſually lodg'd in this ſtate, in a blueiſh indurated clay, ſometimes in a greeniſh Talcy Stone, and from the various accidental admixtures of other Foſſils with it, often makes a beautiful appearance.

Beſide this pure ore of Quickſilver, there is another which is much leſs rich in it, yet is work'd in many places to advantage; as the former is a mixture of Quickſilver and Sulphur alone, this is a mixt body of thoſe two and many other ſubſtances, and appears in form of a moderately hard Stone, uſually of a duſky orange colour, but not rarely of a greeniſh brown, and ſometimes blackiſh; this has very little brightneſs, and nothing of the ſtriated texture of the native Cinnabar.

The manner of ſeparating Quickſilver from its ſeveral ores, is by pounding them and waſhing off the earthy or ſtony matter by ſeveral affuſions of water; and then adding iron filings, the whole is diſtilled in large iron retorts, and the Mercury comes over pure into the receiver; in ſome places when the ore is very rich, they only powder it and put it into long neck'd earthen veſſels, ſtopping them with moſs and inverting them into other veſſels buried in the ground; then making a fire about them, the ſeparated Mercury runs thro' the moſs into the under veſſel.

The greateſt quantity both of virgin Mercury and its ore, is from Friuli, tho' there are mines of very great produce in Spain and Hungary; and a great deal of very fine native Cinnabar in the Eaſt-Indies.

Pure Mercury is the heavieſt of all known bodies except Gold, and yet is totally volatile in the fire, and that even with a very ſmall degree of heat.

It very readily unites with gold, ſilver, lead, and tin; but of all the metals moſt eaſily with gold, and very difficultly with copper and iron.

It diſſolves in Aqua Fortis, and Aqua Regia.

Our Druggiſts had once a very miſchievous way of adulterating it with lead, but that was eaſily diſcovered, and they have now a much more cunning one of doing it with Biſmuth, which much more approaches to the nature of the Quickſilver itſelf, being like it to be evaporated by heat; this, however, when the Quickſilver is for internal uſe, is an unpardonable crime.

Quickſilver, tho' well known to the Antients in its external appearances, was not at all ſo in its properties, being uſually accounted poiſonous.

Its excellence in medicine is now univerſally known.

THE

THE HISTORY OF FOSSILS.

PART the THIRD.

BOOK II.

METALLA. METALS.

FOSSILE bodies, fuſible by fire, concreting again in the cold, and malleable, or diſtenſible and ductile under the hammer.

This is the diſtinguiſhing characters of theſe bodies in their pure ſtate, but many of them are not found in this pure ſtate in the earth, being reduced by admixtures of Sulphur, and other bodies to the ſtate of ores.

Of this Series of Foſſils, there are only ſix bodies, all naturally comprehended in the ſame Claſs, but each making a ſeparate and diſtinct Genus.

Theſe are Tin, Iron, Copper, Silver, Lead and Gold.

GENUS I.

METALLA.

Stannum.
Tin.

Tin is the lighteſt of all Metals, yet in many of its properties very much approaches to Silver; this metal is never found native, but always in the ſtate of ore in the reducing it, to which Arſenic very often ſupplies the place of Sulphur, and may be ſeparated pure in the roaſting the ore.

There is no metal which affords a greater variety in the appearances of its ores than Tin, as it takes in among its matter not only various other Foſſils of the Spar, Cryſtal and Marcaſite kind, but even very large quantities of the other metals not in the Marcaſite ſtate particularly iron; the Tin ores of moſt parts of the world contain a large quantity of iron, which vaſtly debaſes them in value; and the great advantage and ſuperiority of thoſe of England over thoſe of other countries is, that ours are free from iron; the richeſt Tin ore is what we call Tin grains, which is the ore in tolerably large Moleculæ in a pure ſtate; in the other ores, which are greatly more impure, theſe grains or Moleculæ are much ſmaller, and blended with other matter; ſo that they require great labour and care to ſeparate them, by pounding the ſubſtances which they are immers'd in, and waſhing off the ſuperfluous matter; when this is done the remainder is much the ſame with the native Tin grains, and yields uſually about one half pure metal. In the mixt ſtate theſe impurer ores one with another yield about one fiftieth metal.

It is remarkable, that tho' Tin is the lighteſt of all metals, its ore is the heavieſt of all the metalline ores; it is alſo uſually very hard, bright, ſparkling and blackiſh; it is found in veins between rocks, or in perpendicular fiſſures of the ſtony ſtrata, and comes ſometimes near the ſurface, running down thence to more than two hundred feet deep. The veins are from two inches to three feet in diameter.

The pureſt Tin ore is always found in form of ſmall pyramids, each compos'd of four planes very broad at the baſe, and tapering to a point at the top; this alſo is the figure which Tin gives to Cryſtal in which it is embodied, as it very frequently is in large quantities.

Inſtead of theſe pure ſeparate bodies, the matter of the ore is, however, often blended with ſtony ſubſtances; in which caſe it gives a browniſh or blackiſh colour to the Stone, and is known in it by its glittering and its great hardneſs.

Sometimes it contains among it a large quantity of the matter of common Sulphur, mixt with other foſſile ſubſtances, and is then found in large lumps of a coarſer ſtony matter, leſs bright and ſhining, more friable, and of a duſky yellow hue, and ſometimes from various other admixtures the Stones are of the ſame brittle conſtitution, but of a whitiſh colour.

Another very common admixture with Tin ore, is the ordinary Marcaſite; in this ſtate the ore is of a fine glittering ſilvery white, or of a braſs colour, but this is a very miſchievous admixture, and theſe are the leaſt valuable ores of this metal, as very difficult to work.

It is very common to find Tin ore mixt with that of Lead, and carrying the genuine appearance of ſome of the Lead ores; and in many countries it is alſo found uſually of the appearance of iron ore from its admixtures with that metal.

The moſt frequent however of all admixtures to Tin ore, are Cryſtal and Spar, theſe it naturally tinges to a deep brown, tho' they are not unfrequently found black, and ſometimes red or green, from various other admixtures; theſe and the ſeveral other variations this ore is capable of, make a very elegant figure in the cabinets of the curious, but are not to be deſcribed as diſtinct ſpecies of Foſſils here, being only different combinations of thoſe before deſcribed, and the variations from the different proportions of theſe combinations almoſt innnmerable.

Tin ſeparated from its ore, melts in a very ſmall fire, emitting copious fumes, and burning to a grey calx; it is only ſoluble in its ſtate of ore in Aqua Regia, but in the pure ſtate it readily diſſolves in much milder acids even in vinegar; it is flexile, but makes a crackling noiſe in bending; it gives a bitterneſs like ſilver to its ſolvent, and when melted with that metal, is very difficultly ſeparated from it, but the ſilver by this mixture becomes extreamly brittle; mixed with copper, it makes bell metal; it is mixed with Mercury for the Foils of looking-glaſſes, and with Lead it makes our Pewter; it is alſo celebrated for its medicinal virtues in epileptick caſes, in diſeaſes of the uterus, in the bite of a mad dog, and to deſtroy worms.

METALLA.

GENUS II.

Ferrum.
Iron.

Iron is next to Tin the lighteſt of all metals, and is diſtinguiſhable from all others by its mutual attraction with the Loadſtone, which is itſelf iron in a peculiar ſtate; and its virtues are often aſſum'd by pure iron, merely by its being placed in a proper ſituation, or by ſome other accident.

Iron is ſometimes found native, in a pure and malleable ſtate, but this is very rare; in the ſtate of ore, it is the moſt common and obvious of all metals, and from the various adventitious matters incorporated with it in this ſtate, aſſumes very various appearances;

of theſe ſeveral are known by peculiar names, and have their peculiar properties, as the Magnet, Hæmatites, Emery, and Manganeſe.

Native iron is ever found in the perpendicular fiſſures of ferrugineous ſtones in a ramoſe form, and is perfectly malleable, and anſwers all the characters of pure iron; of this I have ſeen two pieces, the one of half an ounce in weight, the other of near two ounces; but this is one of the rareſt Foſſils that I know of, and is ſo ſeldom met with, that many have thought it was no where to be found.

In the ſtate of ores the appearance of iron is extremely various, it generally, however, diſcovers itſelf by its yellowiſh, reddiſh, or ruſt-like colour, or by its reſemblance to pure iron in colour.

The richeſt ores of iron are found in large maſſes of an extreamly hard ſubſtance, and blueiſh-brown colour, which when broken ſparkle like a maſs of iron where freſh broke. Theſe are very common in the foreſt of Dean in Glouceſterſhire, and are work'd there to great advantage.

Other very rich ores are of a duſky brown, with a tinge of red or copper colour; of this kind are the richeſt of thoſe work'd in Suſſex. Theſe are call'd the Cabala vein.

Other not leſs rich ores are of a pure iron grey, and very ſolid texture, but without any ſhining ſpangles of this kind. There is great plenty of theſe in Derbyſhire.

Others very rich, are of a deep browniſh or blackiſh chocolate colour, with only a few ſpangles. The poorer ores are uſually in form of a lax and porous ſtone, conſiderably heavy, and of a yellow or red colour, or of a mixture between theſe, and a duſky brown conſtituting together a ruſt colour.

Beſide theſe which are properly and peculiarly iron ores, many other bodies contain large quantities of iron, and are work'd for it to great advantage; of this kind are ſeveral of the red and yellow ochres us'd in painting, and the Siderochita or cruſtated ferrugineous bodies; another very ſingular appearance of ferrugineous matter, is alſo in form of Stalactitæ or Icicles which hang down from the roofs of ſubterranean caverns. This ſort is call'd by the workmen bruſh-iron ore; many of theſe Stalactitæ uſually hanging together and forming a ſort of bruſh; and theſe like the Sparry Stalactitæ are form'd to this day. Dr. Woodward has recorded inſtances of their being found hanging from the roofs of caverns, made not by nature but by the tools of the miners.

Another earthy ore of iron beſides the ochres, is alſo what the workmen call Smit; this much reſembles the common Reddle, but is much heavier and more ſtaining in touching. The various admixtures alſo of Cryſtal and Spar with iron ores, afford very beautiful ſpecimens for the cabinets of collectors; but theſe have no right to a place here, being only accidental mixtures of no determinate kind of the ſeveral bodies before deſcrib'd in their proper places.

The ſoft ore before mention'd under the name of Smit, is by the workmen uſually call'd the mother of the mine, and there are two or three varieties of that ſort call'd uſually the Cabala vein, which are of a paler or yellower colour, and are diſtinguiſh'd by the workmen, the former by the name of gentle pit ore, and the latter by that of ball veins.

Beſide theſe, there are yet to be mention'd thoſe ores iron of diſtinguiſhed by authors under peculiar names, as if proper and diſtinct ſpecies of Foſſils.

1. The *Lapis Hæmatites*, or blood-ſtone. This is an extreamly rich and fine iron ore. It is very ponderous, and either of a pale red, a deeper red, or a blueiſh colour, uſually of a very gloſſy ſurface, and when broken of a fine and regularly ſtriated texture; the Striæ converging toward the center of the body, and the maſſes therefore naturally breaking into fragments of a broad baſe and pointed end, appearing ſomething pyramidal.

The Hæmatites is various in its degrees of purity and hardneſs, as well as in its figure. The fineſt and moſt pure is of a botryoide ſurface, the whole ſuperficies riſing into larger or ſmaller roundiſh tubercles; the Striæ of theſe maſſes are very ſmall and ſlender, and the botryoide bubbles are capable of a high poliſh, and are ſet in rings by the Spaniards and Italians, under the name of Nicola.

Sometimes the Hæmatites is of a coarſe texture, a laxer ſtructure, and compos'd of very large filaments; in this ſtate it ſeldom has any tubercles on the ſurface, and is known by many by the name Schiſtus.

There is alſo a yet more impure kind of this ore, hardly at all ſtriated or botryoide, and of a leſs hard ſtructure, which is however of the ſame nature in all reſpects with the others, tho' diſtinguiſh'd by no peculiar name. The pureſt pieces of Hæmatites are richer than any other ore of iron. Hæmatites is common in Suſſex and Glouceſterſhire, and in moſt parts of the world where there are iron ores.

This, beſides its value as an ore, has its uſes in medicine, being eſteem'd a powerful aſtringent, and of late render'd famous in diſeaſes of the eyes.

2. MAGNES. *The Magnet*, or *Load-ſtone.* This is a very rich iron ore, and ſcarce requires any other character than its ſurprizing property in attracting iron. The ores of iron in general, however, are not affected by it till they have been in the fire; but there are ſome which anſwer to it in their crude ſtate, and all the iron may be ſeparated from the other ſubſtances by it. Theſe ores approach much to the quality of native iron.

The Load-ſtone is a very rich ore of iron, found in large detach'd maſſes of a duſky iron-grey, often ting'd with browniſh or reddiſh, and when broken appearing ſomething like the common emery, but leſs ſparkling. It is very heavy, and conſiderably hard, of a perfectly irregular and uneven ſurface, and of a firm ſtructure, but uſually with ſome porous irregularities within.

It freely gives fire with ſteel.

In its purer ſtate, it makes no effervеſcence with Aqua Fortis, tho' it is often debas'd in ſome parts with an admixture of Spar, and will in thoſe effervеſce till the Spar is diſſolv'd.

It is found in England, and all other places where there are iron mines, and the maſſes of it which are leaſt powerful as Magnets, are work'd with conſiderable advantage as iron ores.

3. SMIRIS. *Emery*, This is alſo a conſiderably rich iron ore. It is found in large maſſes of no determinate ſhape or ſize, and is extreamly hard and very heavy. It is uſually of a duſky browniſh red on the ſurface, but when broken is of a fine bright iron-grey, but not without ſome tinge of redneſs, and is ſpangled all over with ſhining ſpecks; which are ſmall flakes of a foliaceous Talc, highly impregnated with iron. It is alſo ſometimes very red, and then uſually contains veins of gold.

It very freely gives fire with ſteel.

It makes no effervеſcence with Aqua Fortis.

It is found in the iſland of Guernſey, in Tuſcany, and many parts of Germany.

This has a near relation to the Magnet, neither of theſe, tho' uſually ſuppos'd diſtinct natural bodies being properly ſo, any more than any other of the ores of metals; for there are frequently found Magnets of the hardneſs and brightneſs of emery, but theſe are ſeldom very ſtrongly attractive, and many maſſes of emery attract iron, and are called Magnets. A great part of the rock of Liſbon is a mixt maſs of magnet and emery ſome parts of the ſame maſſes having the characters and properties of the one, and others of the other of thoſe bodies, as I find by experiments on ſpecimens given me by the very ingenious and inquiſitive Mr. Turbervill Needham.

Emery is of great uſe to the Lapidaries in cutting the harder ſtones.

4. MAGNESIA. *Manganeſe.* This is alſo an ore of iron, but a very poor one, and is never work'd for that metal. It is a denſe, ponderous, and heavy ſubſtance in its fineſt and pureſt pieces, not a little approaching to the texture of the Hæmatites, being compos'd of regular parallel Striæ, diverging from a center to the circumference; this however is rare, and there is alſo another ſomewhat leſs pure kind which is of an iron-grey, and irregularly ſtreak'd like the ſteel-grain'd lead ores; but the common Manganeſe is of a perfectly irregular ſtructure. It is very heavy and moderately hard, and is of a deep duſky grey approaching to black, tho' ſometimes of a ferrugineous brown. It is found in large maſſes of no determinate ſhape, and of a rude, rugged, and unequal ſurface. It has very little brightneſs where freſh broken, except in the finer ſtriated pieces.

It gives fire but difficultly with ſteel.

It makes no effervеſcence with Aqua Fortis.

It is found in many parts of England and Germany, and is of great uſe in glaſs-making.

To theſe we ought alſo to add a ferrugineous matter us'd by the potters, and call'd Petracorius Lapis, or Perigord Stone, which is no more a diſtinct Foſſil than any of the reſt, being only the ſofter and blacker pieces of Manganeſe; theſe names are however but little aſcertain'd by the artificers, and the ſame ſubſtance in the hands of the Potter is call'd Perigord, which in the glaſs-men's is call'd Manganeſe. But the truth is, that the names Manganeſe and Perigord, are far from ſignifying any determinate appearance of iron ore, ſeveral different ores being by the glaſs-men confounded under the name of Manganeſe. Indeed every thing that will anſwer their purpoſe is call'd Manganeſe, and by the Potters ſeveral kinds of Manganeſe are called Perigord, but more uſually the blacker and harder kinds.

It may be ſeen from this and the like obſervations, how very improperly the ores of metals are treated as different ſpecies of Foſſils, as they depend on ſuch uncertain proportions in the various bodies they are compos'd of, that ſcarce any deſcription could be found from one ſpecimen, that would anſwer to another.

METALLA.

GENUS III.

Cuprum.
Copper.

Copper is next to iron in ſpecifick gravity, being lighter than ſilver, lead and gold.

Copper is not unfrequently found native in a malleable ſtate, and this very often in beautiful branch'd forms, ſometimes in ſmall and ſlender fibres, and ſometimes in little globular, or irregularly figur'd maſſes.

It is very little copper, however, that is found in this ſtate, and when reduced to the ſtate of ore, it makes according to its various admixtures many very different appearances. It is moſt frequently either wholly or in part ting'd with green or blue, but ſometimes is grey, and ſometimes reddiſh. It is very frequently blended in ſmall quantities in the common ſtones of ſtrata, in which it ſhews itſelf in different parts in blue or green efflroeſcences. The green and blue ochres alſo deſcrib'd in their proper place, are all a ſort of ores of copper, as the red and yellow are of iron; and the common Pyritæ and Marcaſites frequently contain large quantities of this metal.

One of the richer ores of copper, is a firm and ponderous ſubſtance of a reddiſh grey, and very bright and ſhining where freſh broken, and is uſually of an irregularly ſtriated texture. This is not common in England, but in many parts of Germany is frequent enough, and is of great value, yielding uſually more than half copper.

Another about equal to the former in value, is of a fine ſhining deep blue, nearly as fine as that of the Lapis Lazuli, and is truly a ſubſtance of the ſame kind, but more foul'd with extraneous matter, and uſually vein'd and ſpotted with greyiſh or reddiſh; this is ſometimes conſiderably hard, but more frequently it is ſoft as Spar, and breaks with a ſhining ſurface.

Another ore but little leſs rich than theſe, is of a very firm and even ſtructure, and of a very duſky purple, ſometimes of a blackiſh colour; this is very hard, and when broken ſhews an even and ſomewhat gloſſy ſurface, this uſually yields about one third copper.

And there is beſide theſe another of a fine green colour, ſometimes deeper, ſometimes paler, and uſually conſiderably hard. This is found in maſſes of very uneven ſurfaces often riſing into high tubercles, and ſometimes into ramoſe efflroeſcences like ſhrubs; this ſometimes contains one half copper, ſometimes leſs than one third.

All theſe are liable to various admixtures of other metals, and are debas'd by them in different quantities; theſe turn them often to very different colours from what they naturally obtain, particularly iron, which is the moſt common of all admixtures with them, and which generally tinges them to a reddiſh hue. Arſenic is alſo very frequently mix'd among the matter of them, and not leſs frequently the ſubſtances of the common Marcaſites; the firſt of theſe admixtures turns them white, the other braſſy or gold colour'd.

Theſe are the richer ores of this metal, and theſe are uſually accompany'd with ſome cryſtalline or ſparry matters in different forms, which uſually are ting'd to a fine blue or green, and often imitate the Sapphire and Emerald, the ſeveral varieties of theſe make a beautiful figure in the cabinets of the curious.

The poorer ores are generally of the figure, texture, and appearance of the ſtony or other matter which is the baſis of them; and only betray themſelves by green or blue efflroeſcences.

But beſide all theſe, there are two appearances of the ore of copper, which are uſually treated of by authors as peculiar ſpecies of Foſſils, and ranked among the Gems. The firſt of theſe is the Lapis Lazuli or Cyanus of the Greeks; the other the Turcoiſe.

1. Lapis Lazuli is a very elegant and beautiful ore of copper, of the nature of the ſecond copper ore before deſcrib'd, but differing in purity, as being much leſs debas'd by earth.

It is a firm and compact ſubſtance, of a moderately cloſe texture and conſiderably heavy. It is of no determinate ſhape or ſize, but is found in irregular maſſes from the ſize of a ſmall nut, to that of a man's head. It is naturally of a tolerably gloſſy and polite ſurface, and in the fineſt pieces is of a middle purity between that of Cryſtal and Spar. It is always found naked, not covered with any coat or cruſt, and is in colour of a beautiful deep ſkye blue in its greater part, but is always variegated with a large quantity of an opake white matter, and ornamented with a number of veins of a fine gold colour'd Marcaſite. It is capable of a fine poliſh, and when wrought makes a very beautiful figure. The yellow veins are very bright and gloſſy, and the white have been uſually ſuppos'd to be a Spar, but they are in reality a debas'd Cryſtal; for they make no effervеſcence with Aqua Fortis any more than the blue part.

This is the deſcription of this ore in its moſt perfect ſtate, and it has two varieties, which render it yet more beautiful; the one is its having the white matter very pure and pellucid as Cryſtal; and the other its having the Marcaſite not in form of veins, but in ſmall and ſeparate diſtinct ſpots. The former of theſe appearances has not been honour'd with any peculiar name, but the latter is the Sapphire of the antients, as I have before obſerv'd in the comments on Theophraſtus. All theſe, however, are ſubject to be more or leſs debas'd by extraneous foulneſſes, and at times deſcend into the nature of the common blue copper ore, and ſometimes the ſame ore is found ſo pregnant in copper as to be of an acrid taſte, and have all the properties of verdigreaſe; there is much of this in the Weſt-Indies of a beautiful deep blue, and ſeems tranſparent, which is call'd by ſome, from the name of a town near which it is found, *Lapis Lipis.*

It is found in many parts of the world, but that of Aſia is eſteem'd the fineſt. Its great uſe, beſide the poliſhing as a Gem, is the making the fine blue us'd in Painting, and call'd Ultramarine. The Aſian Lapis Lazuli affords this ſo fine, that it will always ſtand; but the blue made from the German is apt to turn green.

2, TURCHESIA, the *Turquoiſe.* This is a Foſſil ſubſtance which has ever been accounted a Gem from its fine colour, though it is in reality no other than a copper ore, and that far from one of the hardeſt kind.

The Turquoiſes, however, now known among us, are though both owing to copper and both to the ſame ore of it, of two very different kinds, and two abſolutely different bodies; the one is a mere copper ore in its natural form, which in many reſpects much reſembles that ore of iron call'd Hæmatites. This is the Callais of Pliny, and is found on the ſides of fiſſures of Stones, which contain copper in form of a botryoide effloreſcence, either in ſingle bubbles from the ſize of a pea to that of a walnut, or in conjunct cluſters of theſe rang'd ſide by ſide, and forming large flat maſſes. This is but of a ſoft ſubſtance, though conſiderably cloſe texture, but of a naturally ſmooth and polite ſurface, ſo much ſo indeed that it is often worn without any additional poliſh. It is of a very beautiful pale blue with ſome faint admixture of green, and when broken is uſually found to be like the Hæmatites of a ſtriated ſurface, and not unfrequently compos'd of two or three cruſts.

It will not give fire with ſteel.

It ferments with Aqua Fortis, and is almoſt entirely diſſolv'd by it, and may be calcin'd to a pure white. This is as before obſerv'd very much the ſame ſort of ore to copper that Hæmatites is to iron.

It is produc'd in Perſia, and in ſome other parts of the Eaſt, and is valu'd at a conſiderable price when of a good colour.

The other Turquoiſe is a ſubſtance very different from this, but though it does not wholly owe its origin, it owes its colour and all that makes it taken for a Gem to copper ore. This is the ſubſtance call'd ſpotted Foſſil ivory by Theophraſtus and the antients, and is in reality ivory, or the teeth, or bones of other animals, which have lain in the earth in the neighbourhood of copper ore till they have been ting'd by it with deep blue ſpots and veins; which when the whole is put into a gentle fire diffuſe themſelves through the whole ſubſtance, and tinge it to the fine pale blue we ſee. There are ſeveral mines of theſe Turquoiſes in France, and moſt of what are now worn are of this kind, and an accurate obſerver may often trace the grain of ivory even in the fineſt of them, ſome parts of the ſtreaks of the bone having been harder than the reſt, and receiv'd much leſs of the colour, are eaſily trac'd and diſtinguiſh'd by their whitiſh caſt.

The finer and more perfect of either of theſe kinds of the Turquoiſe, are call'd by our jewellers the Turquoiſe of the old rock, nay, I wear one in a ring, which is of my own making, from a hard bone ting'd with a tincture of copper in an alkali, which is equal to many of the fineſt native Turquoiſes, and is allow'd by our jewellers to be a Turquoiſe of the old rock.

The richer copper ores are found in many parts of Germany and Sweden, and in ſome other parts of the world, the Germans have many very good ones, and we have in England ſome that are little inferior to the fineſt Swediſh.

METALLA.

GENUS IV.

Argentum.
Silver.

Silver comes next to copper in ſpecifick gravity, being lighter only than lead and gold.

Silver is found native much more frequently than any of the former metals, and indeed more frequently in this ſtate than in that of ore; what are commonly call'd Silver ores, being no other than Stones of various kinds, in which there are embedded great quantities of native Silver.

Native Silver is ſometimes alſo contain'd in ſofter Foſſils, as the earths, and is ſometimes found looſe among ſtrata of ſand. The native Silver lodg'd in Stone is uſually diſpos'd in flat maſſes variouſly ſtreak'd ridg'd, and often reſembling Silver lace; that in earths is frequently beautifully ramoſe, but compos'd of roundiſh not flatted branches, and ſometimes in large irregular lumps; and that among ſand is uſually in ſmall roundiſh or oblong Granules; theſe, however, are no more than its general appearances, not its conſtant ones, for it is liable to great varieties in them all.

Silver, though frequently found thus native and pure, is however very frequently found alſo in the ſtate of ore. Very often it is found embodied in the ores of other metals; the white and grey copper ores often contain it, and the lead ores very frequently; and theſe when they contain any conſiderable quantity of it are improperly call'd Silver ores, though their predominant metal is of another kind; nor is Silver uncommon in Cobalt, in antimony ore, and in many other bodies of the metallic kind.

The proper and peculiar ores of Silver are alſo very various in their appearance; its moſt uſual ore is a very ſingular and obſervable body, being naturally malleable. This is a ſoft ſubſtance of a blackiſh blue in colour, and ſo nearly reſembles lead that it has by many been miſtaken for native lead, and indeed moſt of the native lead we hear of is from miſtaken accounts of this ore. It is found in large but irregular maſſes extreamly heavy, and often of an irregularly laminated ſtructure. It is very rich in metal, containing often three fourths of pure Silver.

Among the maſſes of this there are alſo uſually found ſome of a more debas'd nature, containing a conſiderable quantity of arſenic, and a large ſhare of copper; theſe are diſtinguiſh'd from the others by their being of a paler colour, often of a pale grey, and ſometimes nearly white, and by their not being malleable. Theſe contain much leſs Silver than the malleable maſſes.

A ſecond very remarkable appearance of Silver in the ſtate of ore, is in form of brown or browniſh yellow, obſcurely tranſparent maſſes, not a little reſembling the coarſer ſorts of Amber. Theſe are uſually found in large and irregularly ſhap'd Nodules, often of the form of our common Pebbles, but ſometimes flatted and with rugged edges. This ore is but moderately hard and breaks with a ſlight blow, ſhowing a gloſſy ſurface, and ſomewhat of an obſcurely laminated ſtructure; this alſo is very rich in Silver, uſually containing near two thirds of its weight in metal.

But there is beſide theſe another appearance of the ore of this metal, which is ſuperior to all other ores in beauty. This is a very firm and compact ſubſtance, of an even and regular texture and conſiderable weight, and is ſometimes found in large ſhapeleſs maſſes, but not unfrequently in regular ſhoots. It is of a very bright and beautiful red, of a ſmooth even ſurface, and conſiderably pellucid. It reſembles very much the native Sandarach, and is ſometimes exactly of the fine florid red of that body, though often deeper, and ſometimes approaching to a crimſon but very rich in its tinge.

Theſe are the more uſual and determinate appearances of Silver in the ſtate of ore, but there are in regard to this as in all the other metals in the ſtate of ore, numberleſs accidental variations, and there are Stones of all colours and conſiſtences wrought in different places for the Silver they contain; as in the mines of Peru, ſome of the ores, as they are call'd, are grey ſpotted with blue and red, ſome of various ſhades of red with admixtures of yellowiſh or browniſh, and others green, yellow, or black. Some of theſe are of the nature of one or other of the former three, only debas'd by adventitious mixtures; the others are Stones in which native Silver is lodg'd, which are commonly confounded with the reſt under the name of Silver ores.

We have ſome of the firſt appearance of Silver ore in England, which has been miſtaken for native lead, but there does not appear to be any great quantity of it; many of our lead ores contain Silver, and ſome in very large quantities; and Norway and ſome parts of Germany have very conſiderable quantities, both of native Silver and that in the ſtate of ore. The Hungarian Silver ores uſually contain native Silver in form of ſmall and ſlender filaments; this is uſually call'd capillary Silver, and this as well as the native Silver of Peru, though found in Stones of various kinds, yet is moſt frequently met with in a white opake Stone, uſually call'd Spar, but really a debas'd Cryſtal, loaded with a large quantity of a white earth; though ſometimes it is alſo found in genuine Spar.

In ſome parts of Saxony the native Silver is alſo found in ſmall flat ſpangles like thoſe of Talc, and theſe often lodg'd flatwiſe in a coarſe red Stone. And in many of the German mines the red pellucid and malleable black rich ores are found blended in the ſame maſs, and ſometimes with the black wholly covering the red. The black ore of this kind is uſually ſoft enough to be cut with a knife.

METALLA,

GENUS V.

Plumbum.
Lead.

Lead is the heavieſt of all metals except gold; it is a metal which has been very often ſaid to be found native, but the accounts ſeem erroneous. I have ſeen many ſpecimens of what was call'd native Lead, but never any thing that truly was ſo; and am apt to believe, that what has been thought native Lead has always been either the black Silver ore, or ſome more than ordinary pure pieces of Lead ore.

Lead in the ſtate of ore is extreamly common, and no where more ſo than in our own kingdom, where it puts on various appearances, and makes an elegant figure in the cabinets of the curious. Theſe are, however, merely owing to accident in moſt caſes, and the ore is much the ſame in all.

There is indeed one general ſtructure which runs thro' the much greater quantity of Lead ores, tho' being more diſtinguiſhable in ſome, and leſs ſo in others, even thoſe of this kind have acquir'd different appellations. This ſtructure is moſt diſtinguiſhable in what are call'd the cubic or diced Lead ores; and the general conformation of theſe as well as moſt others, is this, the maſſes are all compos'd of angular bodies, much reſembling the Spars of ſome kinds in their ſhape and ſtructure, being of a ſhape either approaching to a parallellopiped or regularly ſo, and theſe either thicker or thinner ones, and each compos'd as in the Spars of the ſame ſhape of great numbers of very thin plates, which are themſelves again compos'd of thinner parallellopipeds. Theſe are the bodies that uſually conſtitute Lead ores, and in ſome are more, in others leſs perfect. In thoſe commonly call'd the cubic or diced Lead ores, and by many by a very indeterminate

terminate name, the Potters Lead ores, theſe parallellopipeds are very regular and perfect; in others they are conſiderably mutilated, by being cruſh'd together in long ſeries, and theſe are commonly call'd antimoniated Lead ores; not that they are ſuppos'd to contain Antimony, but that they are of a ſtriated texture like that body; and in other inſtances where they have been more firmly cruſh'd together, and much injur'd or mutilated in their figures, but not laid in this regular ſtriated form, they are call'd ſteel grain'd Lead ores, though by many theſe two names are confounded. The ſtriated kind when the ſtreaks are looſe, is alſo call'd ſtringy or capillary Lead ore, and when the ſtriæ meet in various angles croſs grain'd ore. Theſe ores are all of them of a blue or grey colour; the kinds commonly call'd the diced or cubic ores, are uſually the blueſt, and the others more grey and ſilvery. And the ſteel grain'd kind when found in ſmall maſſes and purer than ordinary, is known among the miners by the name of Lead grains.

Theſe are the moſt common appearances of Lead ore, and in all theſe, though appearing ſo very different to the naked eye, the help of a Microſcope will diſcover the ſame ſtructure, and ſhew all to be compos'd of parallellopepid maſſes made of thin flakes; though theſe are in the ſeveral kinds more or leſs perfect in their figures and arrang'd in a various order. The accidental varieties of theſe are innumerable, they are often mix'd and blended among one another, and often contain various extraneous matters, as Spar, Cryſtals, Earth, Calamine and the ores of other metals. The Spars and Cryſtals they have about them are alſo very often beautifully ting'd, and the addition of Marcaſite matter to them often adds greatly to their beauty and gaudy appearance, though it is very far from adding any thing to their value. Theſe are the appearances of Lead ore that are well known, and make ſo great a figure in the cabinets of our collectors; but beſide theſe, there is another very different and more beautiful appearance of the ore of this metal. This is in a very beautiful ſemipellucid ſubſtance, uſually of a greeniſh or yellowiſh colour, but ſometimes of a pale grey, and ſometimes whitiſh and pellucid. This is extreamly heavy, and but moderately hard, and is found ſometimes in irregularly ſhap'd maſſes, but more frequently in the form of the regularly ſhap'd cryſtalline Spars; this however is very rare, and when found is uſually miſtaken for a body of ſome other kind.

There are many accounts of other appearances of the ore of Lead as a reddiſh and yellowiſh earthy one, and a greyiſh, a whitiſh, and a browniſh ſtony one; but theſe are only owing to very ſmall Moleculæ of Lead ore of the common parallellopiped kind, being immers'd in Earths or Stones, often in ſo ſmall Moleculæ as to eſcape the naked eye.

The ores of Lead very frequently contain an admixture of Tin, which render them very difficult in the working, though when pure they run with a ſmall fire. Many of them alſo contain ſo large a quantity of Silver as to be work'd for it to very great advantage. Many of the Engliſh Lead ores yield thirty ounces of Silver or more in the ton. Lead when pure, is the ſofteſt, moſt ductile, and leaſt elaſtic, or ſonorous of all metals, and ſeems of a very ſimple nature. It diſſolves in Aqua Fortis, or a weaker acid, but not in Aqua Regia.

METALLA.

GENUS VI.

Aurum.
Gold.

Gold is the heavieſt, the moſt denſe, the moſt ſimple, moſt ductile, and moſt fix'd of all bodies, not to be injur'd either by air or fire, and ſeeming in a manner incorruptible; it is ſoluble by means of ſea ſalt; but is injur'd by no other ſalt; and is moſt eaſily of all metals amalgamable with quickſilver.

Gold is the moſt frequently found native of all the metals, and is indeed very rarely found in a ſtate of ore; that is diveſted of its metallic form, by its particles being penetrated by, and intimately mix'd with ſulphur; and in the few inſtances in which it is found thus it never conſtitutes a peculiar ore, but is found intermix'd among the ores of other metals, and moſt frequently among thoſe of Silver, or thoſe of which, though ſome other be the predominant metal, yet there is a large quantity of Silver among it, in which the Gold lies in its ſtate of ore.

Native Gold, though free from the penetrating ſulphurs which reduce metals to ores, is yet very ſeldom found pure, but has almoſt conſtantly an admixture of Silver with it, and very frequently of Copper; when it has Copper in it, it is eaſily diſcover'd, if in any conſiderable quantity, by its hardneſs; the Silver is not ſo eaſily detected in it.

Native Gold is ſometimes found in pure maſſes of conſiderable ſize, many having been found of more than a pound weight; theſe maſſes are met with in the Gold mines, and are call'd Aurum Obryzum, or Obryzium, but they are very rare; ſuch however have been found at times in the German mines.

Its more common appearance in its looſe ſtate is in form of what is call'd Gold duſt; this is native Gold in ſmaller maſſes, uſually indeed very ſmall mix'd among the ſand of rivers. This is found in many parts of the world, but the greateſt quantity of it is from Guinea: ſome is to be met with in the beds of ſome of our own rivers in Scotland.

Native Gold in a middle ſtate as to ſize between theſe two kinds, is alſo found in the clifts or perpendicular fiſſures of the ſolid ſtrata in the mountains of Chili. Theſe fiſſures are uſually fill'd up partly with a reddiſh marle, partly with native Gold immers'd in a debas'd cryſtalline Stone of a blueiſh hue, and partly with looſe native Gold, which is uſually found in flat pieces, from the ſize of a pea to that of a horſe-bean; the quantity however, ſo far as has yet been diſcover'd, is not great.

Theſe, though not unfrequent in thoſe parts of the world where there is Gold, are however far from being its moſt common appearance; for it is generally, and in the greateſt abundance found bedded in maſſes of hard ſtone which lie at vaſt depths, being often dug at a hundred and fifty fathoms; there is no peculiar ſtone in which the gold is found in theſe places, but it is met with indiſcriminately in ſeveral kinds; ſome ſofter, ſome harder, and even in earths. The richeſt maſſes are uſually of a whitiſh and ſomewhat bright, but opake ſtone, which is a debas'd cryſtal containing a large quantity of a white earth, this is often ting'd in part alſo with black, and ſometimes with other colours; yet through all theſe different ſtains, the nature and texture of the ſtone may be eaſily diſcover'd to be the ſame, and often the whole variety of colours will be found in one maſs. In this ſtone the Gold lies in a very beautiful form and a great variety of figures; ſome parcels of it are variouſly divaricated, or in form of ſmall branch'd figures; but theſe are very rare; others are variouſly interwoven in narrower or broader veins, and other in ſmall flat ſpangles intermix'd with ſpecks of black; the ſtone in which this is uſually lodg'd will very readily give fire with ſteel; and will not at all ferment with Aqua Fortis.

Beſide this, however, there are many coarſer ſtones in the mines of Peru, which hold conſiderable quantities of gold, viſible in large or ſmaller ſpecks; and theſe are of all colours, but uſually white or reddiſh; the Gold in theſe is uſually in ſmall ſpangles, but there is no certainty either in the ſize of the maſſes of pure native Gold in this or any other ſtate; that of the coaſts of Guinea, uſually call'd Gold-duſt, and commonly finer than the ſmaller ſands, yet ſometimes affords pieces of three or four ounces weight, and the lumps of Aurum Obryzum as it is call'd, have been found of between twenty and thirty pound weight; theſe things however, are not common.

Pure Gold is ſo fix'd in the fire, that Boerhaave inform us of an ounce of it being ſet in the eye of a glaſs furnace for two months, without loſing a ſingle grain.

APPENDIX
TO THE
HISTORY
OF
FOSSILS.

Of animal and vegetable ſubſtances bury'd in the earth.

1. *Of vegetable bodies.*

Theſe are principally of three kinds. 1. Trees or parts of them. 2. Herbaceous plants, and 3. Corals.

Of trees, or parts of them bury'd in the earth.

THESE are, according to the time they have been in the earth, and the matter they have lain among, more or leſs alter'd from their original ſtate, ſome of them having ſuffer'd very little change, and others being ſo highly impregnated with cryſtalline, ſparry, pyritical or other extraneous matter, as to appear mere maſſes of ſtone, or lumps of the matter of the common Pyrites, of the dimenſions and more or leſs of the internal figure of the vegetable bodies, into the pores of which they have made their way. The foſſil wood which we find may be ranged into theſe kinds. 1. The leſs altered. 2. The pyritical, and 3. The petrified.

Of thoſe parts of trees leſs altered from their original ſtate, the greateſt ſtore is found in digging to ſmall depths in bogs, and among what is called peat, or turff earth, a ſubſtance us'd in many parts of the kingdom for fuel; in digging this, uſually very near the ſurface, they find immenſe quantities of various vegetable matter buried; in ſome places, whole trees ſcarce at all alter'd, except in colour; the oaks in particular being uſually turn'd to a jetty black; the firs are in this ſtate as inflammable as ever, and are often found containing between the bark and wood a plain roſin. Morton alſo mentions a whole ſmall maple he found in a ſtratum of clay at a conſiderable depth; and I have often met with pieces of wood very little alter'd from their original ſtate in ſtrata of loam among gravel, and even in the ſolid beds of ſtone, particularly at the great quarry at Mr. Allen's near Bath, ſome hard parts of an elm of more than four foot, which was ſtill ſoft enough to be eaſily pierced with the point of a knife.

Beſides the whole trees or conſiderable parts of them, there are continually found in the peat earth in vaſt abundance, the fruits and catkins of other trees; theſe are intermix'd among the roots of ſedge, &c. and are ſcarce at all alter'd in their texture, the moſt common of theſe are hazel nuts, and near Whitleſea, a town in the iſle of Ely, I remember to have ſeen vaſt abundance of the twigs and leaves of the white poplar, ſmall branches of hazel, with the ſceletons of the leaves and catkins in prodigious abundance; a little lower down there was a vaſt quantity of half diſſolved and ſhatter'd wood, with its cracks filled with a black bituminous ſubſtance; and among this the workmen told me they found ſometimes the ſtones of plumbs or ſome ſuch fruit, but theſe very rarely; in places where the fir and pine kinds are buried, the ſmaller twigs and the Cones or fruit are frequently alſo met with nearer the ſurface; in many parts of the iſle of Ely, and ſo near us as about Windſor, in the bogs there is great plenty of oaks; ſometimes whole trees are diſcovered, and the wood is little inferior in hardneſs to that of the moſt ſolid freſh tree.

The foſſile trees are uſually found without their roots, tho' theſe very roots, and even the leaves and fruit are often found in the ſame earth at ſome diſtance, many of the trees are broken off near the root; theſe lye horizontally, and have many of their larger branches alſo ſever'd from them, and found at ſmall diſtances; the extremities of the boughs are uſually broken off, and where the roots lye in an irregular poſition, their extremities are uſually broken off alſo; but theſe more frequently ſtand in their natural poſture erect, and with their large roots running in their natural direction down into the clay, or other firmer bottom of the bog, and not unfrequently the ſtumps of theſe appear above the ſurface, the trunks lying at ſome ſmall diſtance.

'Tis idle to imagine that theſe have been buried either at the creation, or the general deluge; at the firſt of thoſe times the ſtrata muſt have been form'd before trees were yet in being, and the peat wood in particular is ſo far from being of Diluvian date, that much of it has been growing within this three or four hundred years in the very places where it is now buried; in this ſtate, that is, little alter'd from their natural condition it is, that we principally find the fruits and larger parts of trees.

What we find of them more alter'd, are ſometimes large and long branches of trees, ſometimes ſhorter, ſometimes ſmall fragments of branches, and moſt frequently ſhapeleſs pieces of wood.

The larger and longer branches are uſually found bedded in the ſtrata of ſtone, and theſe are uſually more or leſs alter'd into the nature of the ſtratum they lie in.

The ſhorter and ſmaller branches are found in vaſt variety in the ſtrata of blue clay, of which they make tiles in the neighbourhood of London; theſe uſually carry the whole external reſemblance of what they once were, but nothing of the inner ſtructure, having all their pores ſo filled up with the matter of the common vitriolick Pyrites as to ſeem pure maſſes of that matter; theſe fall to pieces on being expos'd to a moiſt air, and are what are principally uſed for the making green vitriol or copperas.

The irregular maſſes or fragments of wood are principally of oak, and are found among gravel, and in many other ſtrata theſe are variouſly altered by the inſinuation of cryſtalline, and ſtony particles, but ſtill preſerving the veins of wood, they make a beautiful figure when poliſh'd.

Theſe, according to the various matter that has fill'd their pores, aſſume various colours, and the appearance of various Foſſils that have filled them, ſome are perfectly white, and but moderately hard, others of a browniſh black, or perfectly black, and much harder; others of a reddiſh black, others are yellowiſh, and others greyiſh, and others of a ferrugineous colour; they are of different weights and hardneſſes according to the nature or quantity of the ſtony particles they contain; the moſt ſingular of theſe that I have met with, are two in my own poſſeſſion, the one with its pores filled every where with a pure pellucid Cryſtal, the other a black maſs which was ſimple oak within this hundred years, having been put as a prop to a roof of one of the mines in the Hartz foreſt, yet now is ſo perfectly petrify'd as to ſtrike fire with ſteel; this is much of the ſame kind with the famous Foſſil wood, of the Lough Neagh in Ireland, which the ingenious Mr. Simon has taken great pains to prove of recent petrefaction; and this is a plain evidence of the poſſibility of that being the caſe. Mr. Simon has made many accurate experiments to prove this, and has favoured me with large quantities of the wood, ſome of which is wholly, ſome only a part petrify'd. In the ſpecimens I have from Germany, ſome have veins of ſparry, ſome of earthy, and ſome of matter reſembling that of the common pebbles; theſe ſometimes, tho' rarely, have the ſhape of parts of branches of trees, they more uſually look like broken pieces of boards, and are generally found capable of a high poliſh.

Many ſubſtances have, it is certain, been preſerv'd in the cabinets of the curious for petrify'd wood, which have very little right to that name; but where the fibroſe and fiſtular texture of the ſtriæ, and the veſtiges of the Utriculi and Tracheæ or air veſſels, are yet remaining, the bark yet perfect, and the ſeveral circles yet viſible, which denoted the ſeveral years growth of the tree, none can deny ſuch ſubſtances to be real foſſile wood; and ſuch as theſe are often cover'd with efloreſcences of Spar or other minerals, and frequently contain veins of pure Spar or Cryſtal.

Of

Of herbaceous Plants buried in the Earth.

Tho' the Foſſil wood, and parts of trees are found lodg'd in all the different ſtrata, and alter'd in very various degrees, this is by no means the caſe with the herbaceous plants; they are uſually immers'd either in the black ſlaty Stone, found over the ſtrata of coal, or in looſe nodules of a ferrugineous matter of a Pebble like form; and are ever alter'd into the appearance of the matter they lye among.

What we meet with of theſe are principally of the plants of the Fern kind, and what is very ſingular, but what I have diligently enquired into as well as many others, is, that theſe are many of them of American growth, not the product of our own climate, as many of the foſſile ſpecimens I am poſſeſſed of agreeing with the ſpecimens of the American Ferns among my dry'd plants, as with thoſe of our own; beſide the Polypody, Spleenwort, Trichomanes, Oſmunda, and others of the Fern kind, we ſometimes, however, meet with pieces of the Equiſetums, or Horſetails, and joins of the ſtellated plants, as the Clivers, Madder, and the reſt; which are often miſtaken for flowers; and ſometimes with compleat graſſes, and parts of them, as alſo of reeds, and other water plants; ſometimes the Corns, and not unfrequently the twigs, or bark, and impreſſion of the bark and fruit of the pine and fir kind, which are frequently miſtaken for the parts of fiſh from their ſcaly appearance; and ſometimes, but very rarely, we meet with the moſſes and ſea plants. Many of the Ferns we find are of very ſingular kinds, and ſeem ſpecies yet unknown to us, and the leaves of ſome appear ſet at regular diſtances with ſmall round prominences, or cavities, and of others of a reticular texture. Many of the Stones where ſplit, are found to contain on one ſide the impreſſion of the plant, and on the other the prominent plant itſelf; beſides theſe, there have been often erroneouſly ſuppos'd to be found with us ears of wheat, and of the Indian corn, the firſt being no other than the naked endmoſt branches of the common fir, and the other the thicker boughs of various ſpecies of that tree, and the pine with their leaves fallen off, which cannot but afford many irregular tubercles and Papillæ, and in ſome ſpecies ſuch as are more regularly diſpos'd.

Theſe are the ſpecies more obvious with us, they are moſt plentifully found in the black ſlaty ſtone over the coal, and this is diſpos'd in whole ſtrata; thoſe in the ferrugineous one are uſually included in nodules or detach'd maſſes, of a Pebble like form, uſually ſomewhat flatted and eaſily ſplitting on being ſtruck; they are common in Kenton coal pits about Newcaſtle, and in the foreſt of Dean in Glouceſterſhire, but thoſe of the foreſt of Dean are of a harder ſtructure. Tho' theſe are the only ſpecies of Plants, certainly known to be found with us, yet in the German Dominions there are many others met with, and that in various other bodies; a whitiſh Stone a little harder than chalk frequently contains them, often they are found in a grey ſlate Stone, of a very fine texture, often in a blackiſh blue one, and in many others; nor are the bodies themſelves leſs various than the matter in which they are found, the leaves of trees are very often found there, of which the poplar, willow, white thorn, and pear tree, are the moſt frequent; the ſpikes of the ſummer barley are often found there; and the moſſes as well the larger as the ſmaller kinds, are found there alſo in great perfection, as are alſo ſmall branches of box, leaves of the olive tree, and branches of common garden thyme. There are many other vegetable bodies mentioned as found in this ſtate by authors, but as in bodies ſo imperfect, errors are too eaſily fallen into, theſe ſeem all that may be aſcertained beyond mere conjecture.

Finally to theſe Foſſil plants muſt be added, thoſe buried in ſtony matter of more recent date, which are alſo common in Germany; theſe are leaves of oak and other trees which grow over ſprings where waters are impregnated with Spar; which are often cruſted over as our moſſes are at Knareſborough, and many other parts of England, with ſeveral coats of Spar, and are ſometimes found buried in large maſſes of it.

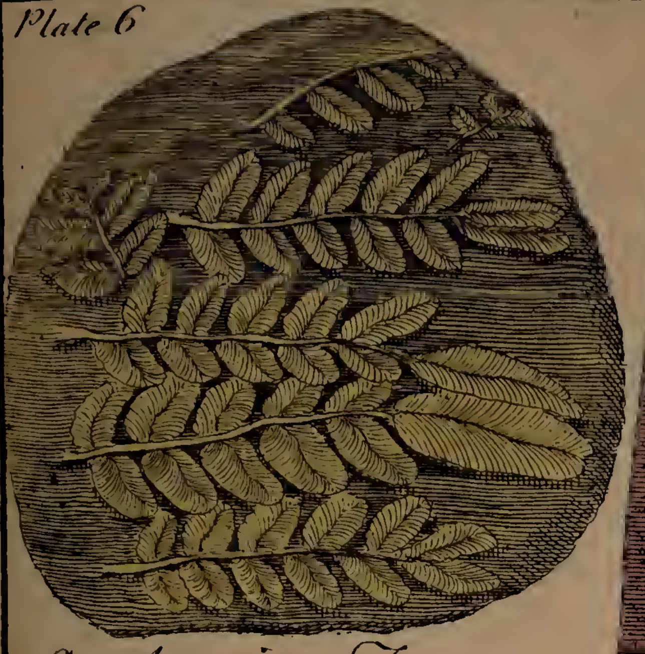
This whole ſeries of bodies of which the variety is almoſt infinite, makes a very elegant figure in the cabinets of the curious, and the ſpecies are very worthily preſerved there; the judicious reader will, however, eaſily conclude, that they have no right to peculiar names as foſſile bodies, and that the appellations of Striatula Lithopteris, and Neurophyllon given them by ſome authors, are no more determinate or neceſſary than that of Coruſcatula to one of them, becauſe covered with a coat of ſhining matter, tho' within of the ſame figure and texture with many others of the ſame ſeries: It may not be

improper,

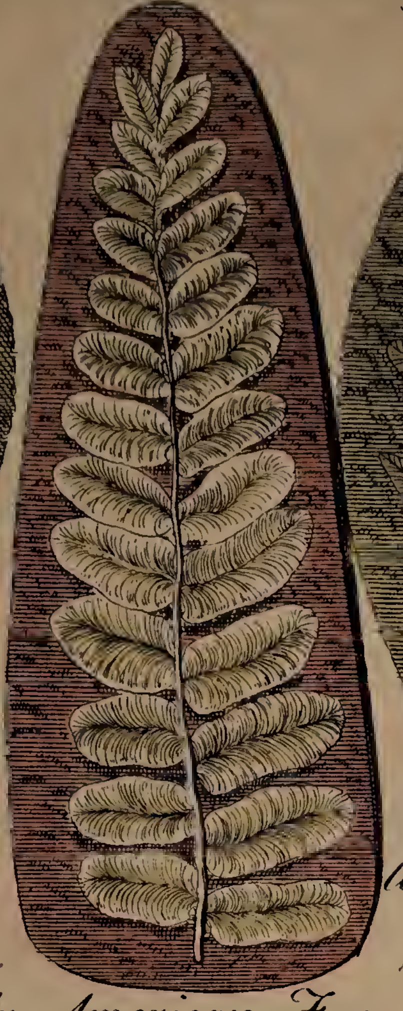
VEGETABLE BODIES IMMERS'D IN STONE.

Plate 6

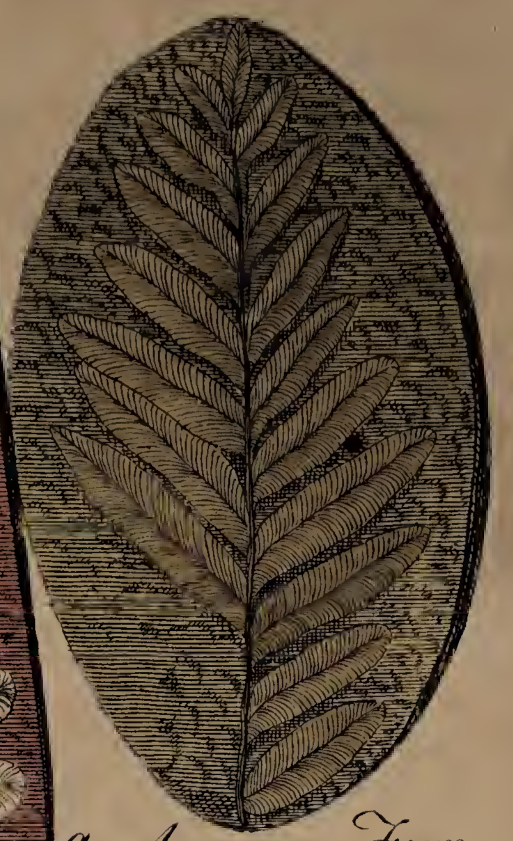
Pa. 640



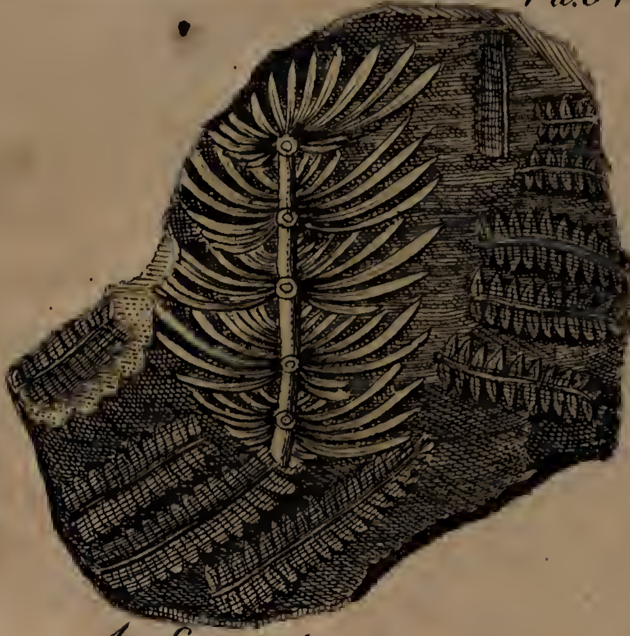
An American Fern



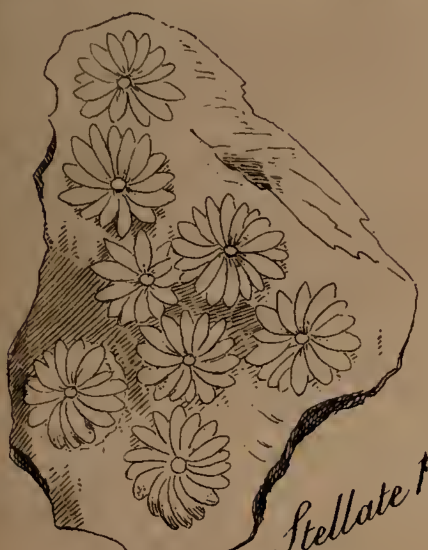
An American Fern



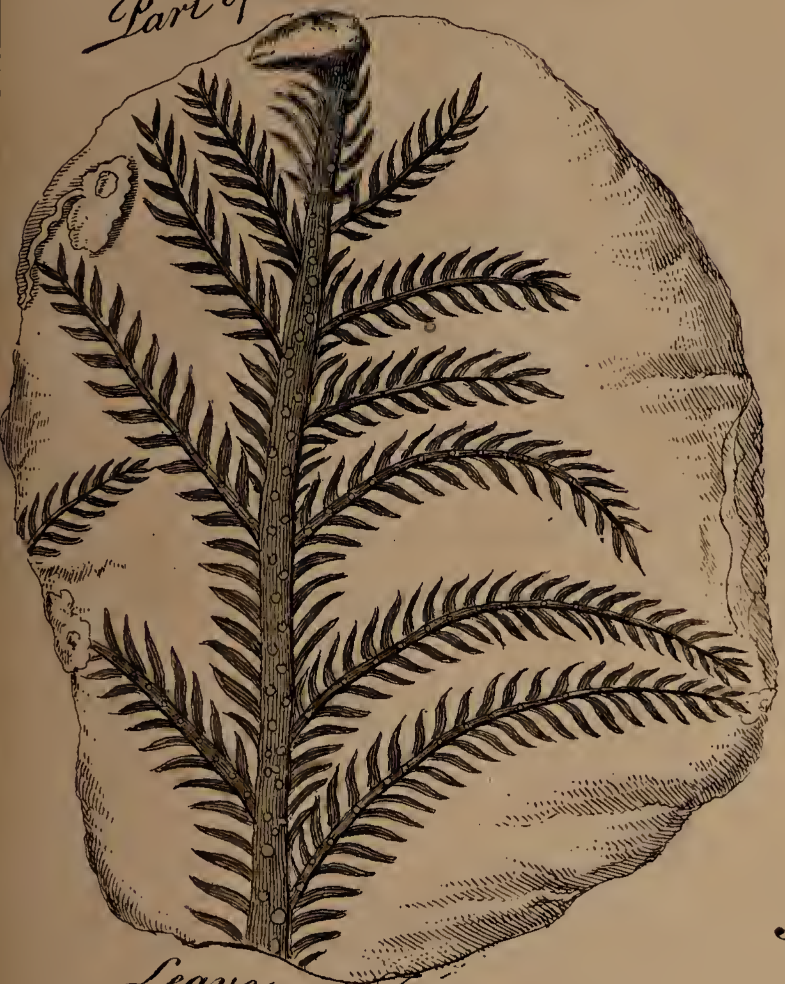
An American Fern



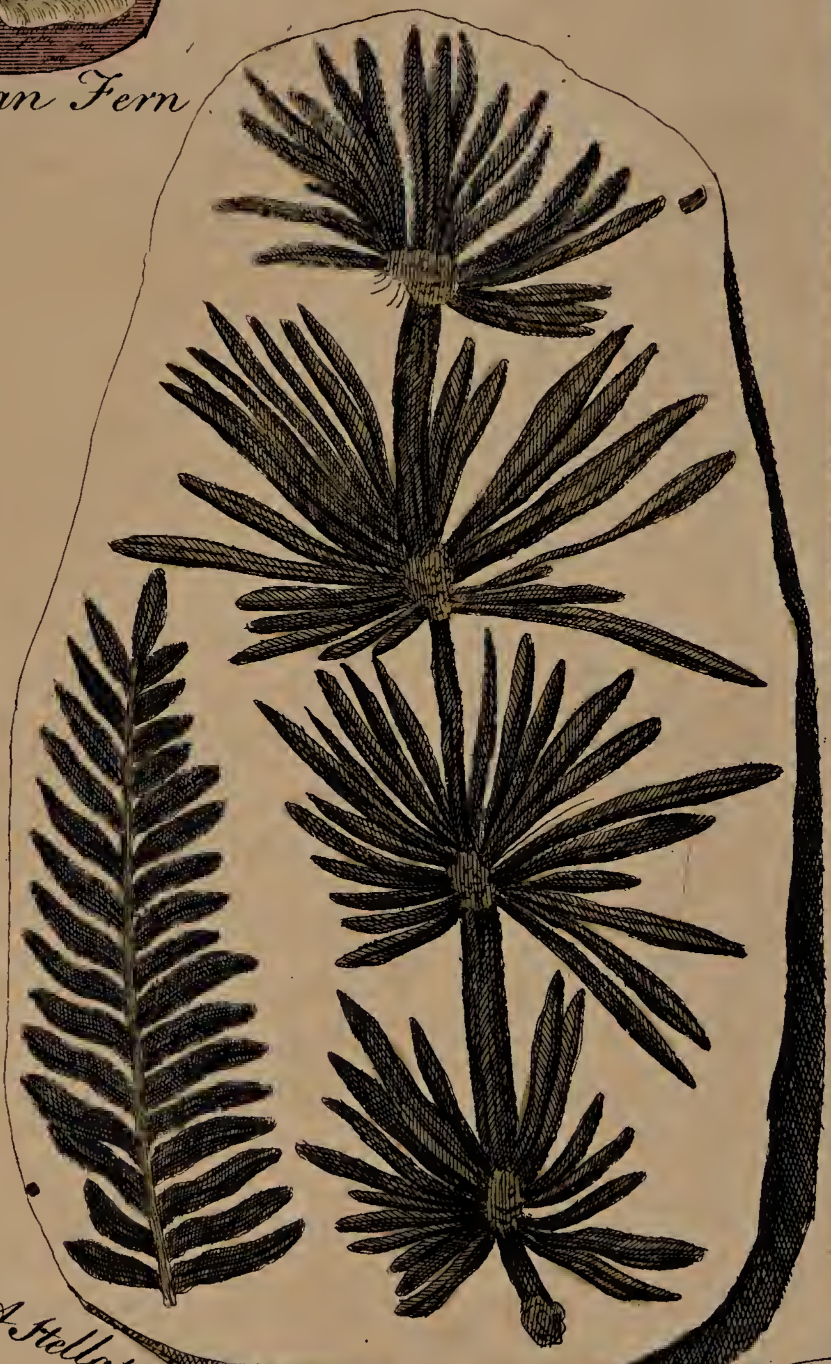
An Equisetum



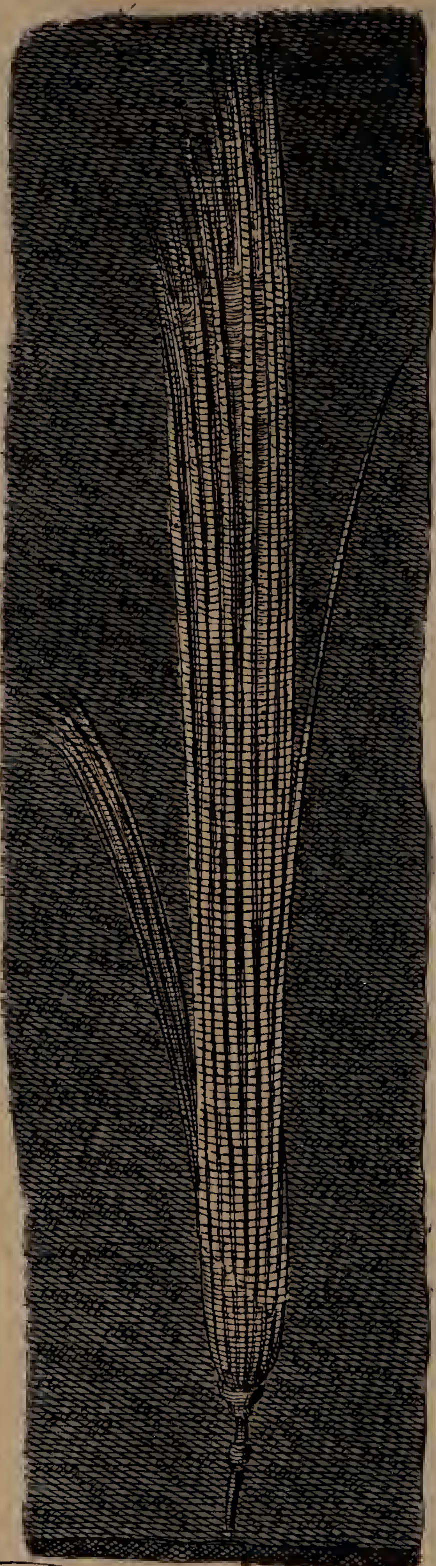
Part of a Stellate Plant



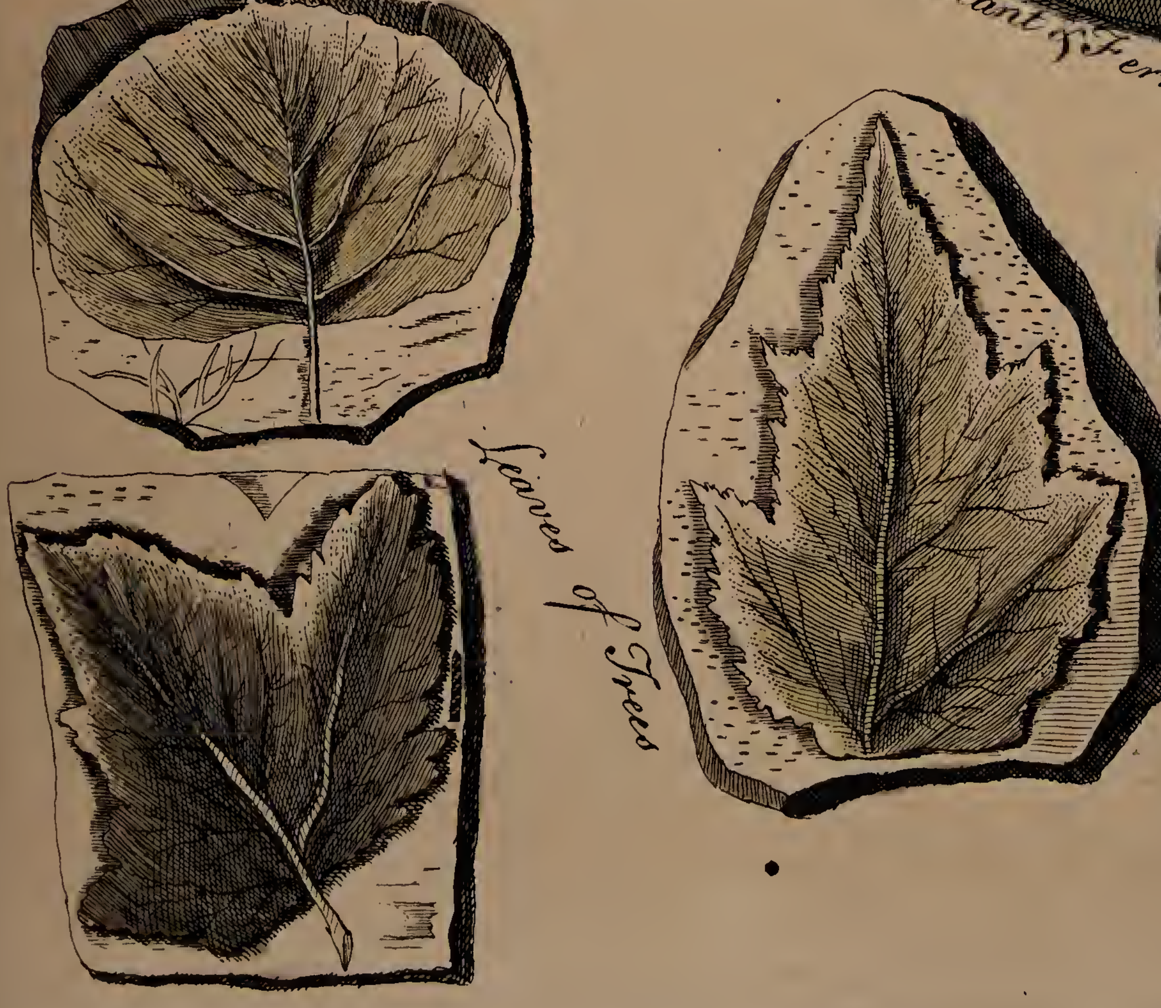
Leaves of Trees



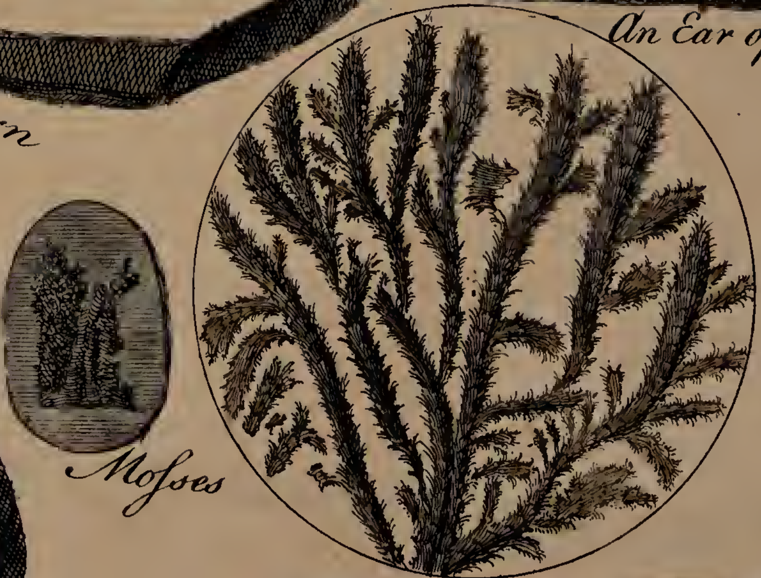
A Stellate Plant & Fern



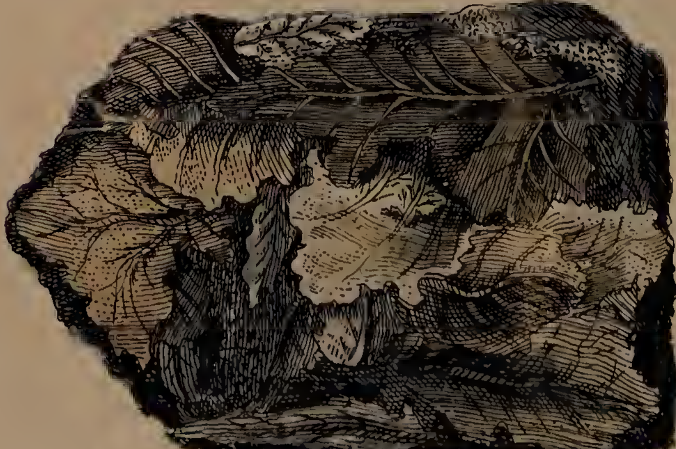
An Ear of Corn



Leaves of Trees



Moſses



Leaves of Trees incruſted with ſpar

B Cole ſculp

improper, however, to add the figures of the moſt remarkable of theſe, partly from ſpecimens of my own, partly from Scheukzer and other authors, and the collector will be able in general to refer whatever he finds to one or other of the before-mentioned ſpecies, allowing for the ſeveral imperfections and other accidents attending them. The deſcription of the ſeveral ſpecies is our buſineſs in a hiſtory of plants, not in this work; and even that can never be made perfect in this reſpect, as there are many ſpecies found foſſile, which are by no means reducible to any known plants of recent growth, and are in themſelves mutilated and too imperfect to form deſcriptions on; theſe have probably been the produce of regions yet unknown to, or at leaſt unſearched by us.

Of Corals buried in the Earth.

Theſe are very common with us, and are of great variety and beauty; they are ſometimes found looſe in the ſtrata of clay and chalk, but more uſually they are immers'd in the ſubſtance of hard Stone, and uſually have their own pores ſo filled up with ſtony particles, as to ſeem themſelves mere Stones; multitudes of theſe are of the ſame ſpecies with thoſe now found at ſea, but many are of unknown kinds, probably the natural produce of ſeas or ſhores yet unſearch'd; but it is remarkable that the common red Coral, tho' ſo very frequent at ſea, is ſo ſcarce in the Foſſil world, that there is ſcarce one credible account of its having ever been met with.

Dr. Woodward's opinion of theſe having been form'd in the waters of the deluge, and being genuine mineral and not vegetable bodies; I have elſewhere * anſwered at large: The bodies themſelves indeed carry that anſwer with them, and are the proper ſubjects of deſcriptions in a hiſtory of Plants not of Foſſils. The ſeveral white Corals known as marine productions, are almoſt all in one place or other found foſſile; and beſide theſe, there are many which we yet know not in their recent ſtate; ſeveral of theſe have been honour'd with peculiar names by the writers on theſe ſubjects, and it may not be improper to add the figures of the more ſingular ones, partly as before from the ſpecimens themſelves, partly from the works of other authors.

Beſide the more common Corals, the Mycetitæ or Fungitæ, frequently found adhering to them in their recent ſtate, are often alſo found foſſile, and uſually immers'd in Stone, ſometimes in Clay: the more frequent of theſe are of a conic ſhape, ſometimes flatted and diſcoide, and ſtriated longitudinally: to theſe and ſome other bodies of this kind, Mr. Lloyd has given the name Columella, and to one of them the name of Branchiale, from its imaginary reſemblance to the gills of a fiſh, and to another, that of Undulago.

The *Porpitæ* or hair-button ſtones of Plot, and other authors, are foſſil Corals of a rounded figure, uſually conſiderably flatted and ſtriated from the center toward the circumference; theſe are greyiſh, whitiſh, browniſh or blueiſh, and are uſually found immers'd in ſtone.

The *Porus's* are Corals of a beautifully laminated ſtructure, and ally'd to the Mycetita. Theſe are uſually found lodg'd in marble.

The *Tubulariæ* are corals compos'd of longitudinal pipes, often of the figure of ſo many worms rang'd parallel to one another in a maſs. Theſe are uſually found either in maſſes in a lax Stone, or in ſingle tubules in the harder and more compact ſtones, and in theſe two ſtates they make two very different appearances, and according to their different directions, ſections and other accidents, make a very great number of the varieties preſerv'd by the lovers of figur'd Foſſils.

The *Junci Lapidei*, as they are call'd, are plainly congeries of the ſame tubules; theſe are uſually round and ſtriated within.

The *Aſtroites* or Star-Stone is ally'd alſo to theſe, and is variegated with either complex or ſingule tubules lodg'd in different ſpecies of ſtone; theſe are ſtriated from the center to the circumference, and their ends are ſometimes prominent above the ſurface of the maſs; ſometimes they are level with it, and ſometimes ſunk in below it; and partly by theſe variations which are merely accidental, and partly from the different ſpecies of the Coral that they owe their origin to, theſe alſo make a very great number of elegant ſpecimens for the curious collector. The Corals forming theſe ſtars are according to their ſeveral ſpecies, ſometimes round, ſometimes angular, and their columns are ſometimes ſeparate, ſometimes the ſtriæ run into one another. The ſtones which contain the hollowed Stars are often beſet naturally with numerous tubercles, and the Stars often are very elegantly hollow'd, and not unuſually they are full of numerous cavities, round at their external ſurface, and only ſtar'd at the bottom. The cavities of theſe often run alſo very deeply and irregularly into the ſubſtance of the Stone.

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* Notes on Theophraſtus.

The *Lithoſtrotion* of authors is of the ſame claſs, and is in the different kinds either round or angular in the columns, and is found in ſingle or complex ſpecimens.

The *Honeycomb-Stone* is of this kind alſo, and is full of large hexagonal cells reſembling thoſe of a honeycomb; theſe are lightly ſtriated and uſually run deep into the ſtone.

The Sea-Coral, commonly known by the name of the brain-ſtone, is frequently alſo found foſſil; and the more common foſſil Corals, whether found looſe, or immers'd in ſtone, always preſerve their regular internal texture, as well as external appearance, being according to their ſeveral ſpecies either ſmooth, reticulate or ſtellate on their ſurface; and Dr. *Woodward*, according to theſe, and their ſtriated, lamellated, or tranſverſly divided inner ſtructure, has rang'd them into a ſort of general method; but as theſe are the determinate characters of the bodies in their recent ſtate, they can have no place with us in the deſcriptions of Foſſils.

The foſſil Corals are ſometimes found of the very ſame ſubſtance they were of when in the ſea: This is principally the caſe with thoſe found in the ſofter ſtrata, but theſe are found but rarely; they are uſually found with all their pores ſated with ſparry, cryſtalline or ſtony matter, and ſome converted into mere Agates.

All the ſpecies are found very plentifully with us as well as in other countries. The Mycetitæ are common in our chalk-pits and lime-ſtone quarries, and ſometimes in our clay-pits, and the others principally in the firmer ſtones, or in marble; one of the largeſt and fineſt I have ſeen, I pick'd out of a ſtratum of blue tile-clay in the pit behind the hoſpital at Hyde-park corner. The figures annext, will give ſome general idea of what authors mean by the ſeveral names they have given the foſſil corals; but the perfect underſtanding them, and being able to diſtinguiſh ſcientifically, and reduce the varieties to their ſpecies, and the ſpecies to their proper genera, muſt be learnt from the ſtudy of them in their vegetable form; and one advantage of the ſucceeding volume of this work will be, that in the deſcriptions of them in their native or vegetable ſtate, regard will be had to their ſeveral appearances in this their accidental ſtate of exiſtence, a thing much wanted, but not yet attempted in any of the hiſtories of plants.

Of animal ſubſtances bury'd in the earth.

Theſe are principally of four kinds. 1. Sea ſhells. 2. The teeth, bony palates, and bones of fiſhes. 3. The bones of land animals, and 4. Compleat fiſhes.

Theſe are found in various ſtates and conditions, according to the nature of the matter they have lain among, and to other accidents; ſome being very perfect and of their natural colour and texture, and ſcarce at all different from thoſe now found at ſea; others variouſly alter'd by the inſinuation of ſtony and mineral matter; and in the places of others which are now wholly gone, we have only Spars or other mineral matter remaining in their ſhape and form; or elſe the ſtony or other matter which had fill'd their cavities.

Theſe are ſometimes found looſe among the laxer ſtrata, and ſometimes cloſely embedded in ſtone; and of the ſhell-fiſh kind, we find not only moſt of the ſpecies now known at ſea, but very many others which our preſent imperfection in the animal hiſtory leaves wholly unknown to us in their recent ſtate; and many of the figur'd Foſſils, which have ſo long exercis'd the imaginations of the writers on theſe ſubjects to fix their true origin, will doubtleſs hereafter be found to be parts of animals yet unknown.

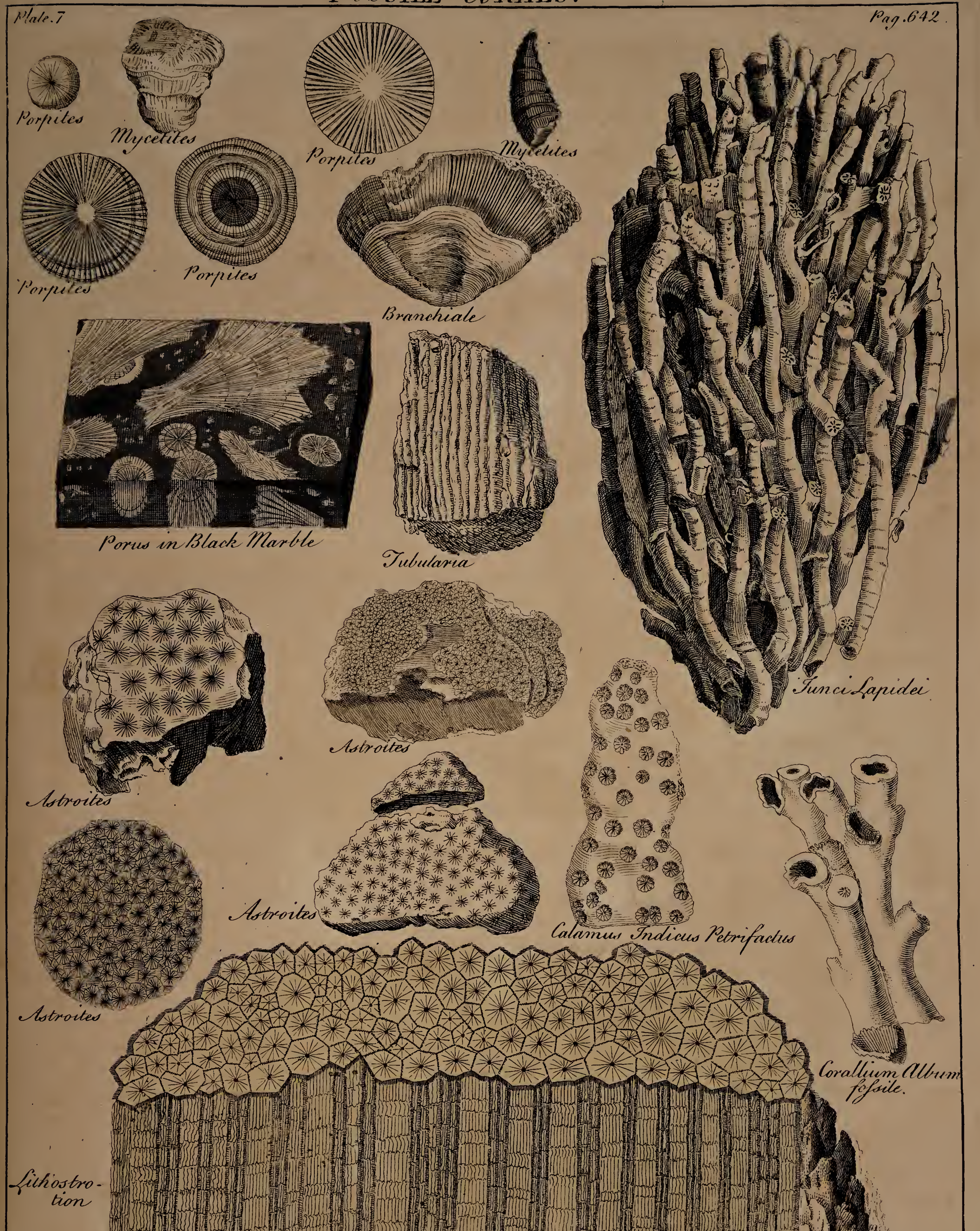
Were it only our own ſhores that had furniſh'd our iſland with foſſil ſhells, they might give us many yet unknown; this can be by no means doubted, when even the iſland of Sheppey, ſo near us and ſo well known, furniſh'd me this laſt ſummer with ſome ſpecies hitherto deſcrib'd by no author; and doubtleſs the ſhores more diſtant and leſs reſorted to may afford vaſt numbers. Who yet can ſay, that even the Conchæ Anomiæ and Ammointæ are not found living on the ſhores of the remoter parts of Scotland or of Ireland? Not that it is at all neceſſary to ſuppoſe this, ſince we are not allotted only the ſhells of our own ſeas to be found foſſile with us; but the Nautilus Græcorum, and many other ſhells common only to very diſtant ſeas, are found bury'd in vaſt plenty in our ſtrata.

The

FOSSILE CORALS.

Plate.7

Pag.642.



B. Cole Sculp

The reader will eaſily conceive, that it is by no means the buſineſs of a hiſtory of Foſſils, to give the deſcriptions of the ſeveral ſpecies of ſhells, as Foſſils, becauſe found bury'd in the earth; or to give the hiſtory of the Shark, the Whale, or the Elephant, becauſe we ſometimes find the teeth of one, or the bones of another ſometimes bury'd in the earth; theſe things are to be expected in the animal hiſtory; and the great misfortune of all the works of this kind hitherto publiſh'd, has been the little knowledge their authors have had of the extraneous Foſſils, or the little care they have taken to compare them with the parts of the animal they belong to while there under conſideration.

All that it can be proper to do here, is to give the figures of the more remarkable bodies of this kind, and aſcertain the names by which they are uſually diſtinguiſh'd.

Of the land animals we have no inſtance that I know of, of any one being found wholly preſerv'd under the earth; but the parts of them are very common, and ſome of them in ſuch places and in ſuch quantities, that it muſt amaze every one to think how they came there.

The tuſks and grinders of Elephants are not unfrequently found bury'd in the hardeſt ſtone. The horns of ſeveral of the Deer kind are frequent in Ireland, and in many parts of England in prodigious quantities, and at great depths in the different ſtrata of Earths.

The teeth of horſes and other quadrupeds are alſo found not unfrequently; and the tuſks of the Boar have been ſometimes met with; and the teeth of the Hippopotamus, and the ſtronger bones of animals of different kinds are alſo common; theſe are ſometimes looſe in earth, and ſometimes immers'd in ſtone. In France and other places where theſe have lain in the way of coppery particles, they become ſpotted with blue, and after the colour is diffus'd by fire, are one ſort of the Turquoiſe; and in the caverns of Germany, they become impregnated with a peculiar kind of earthy Spar, and are then the unicornu Foſſile of the ſhops. And all the teeth, *&c.* are found ſometimes in their native ſtates only a little decay'd, and ſometimes petrify'd by the inſinuation of ſtony particles, into the hardneſs of the common pebbles.

Of the ſea animals, the foſſil world affords us much more numerous inſtances. Whole fiſh in all their exact dimenſions only flatted, are frequently found in Germany, in a white and often in a duſky ſtone, and in other ſpecies of Foſſils; theſe are perfect in their ſeveral forms, and eaſily known as to their ſeveral ſpecies; but the deſcriptions of theſe can have no place here.

The parts of Fiſhes are much more frequent in the foſſil world, than the whole bodies of them, and are found in ſuch amazing numbers in ſome places as to aſtoniſh all who ſee them, and are in greater or leſſer quantities met with in all parts of the world.

The vertebræ of the whale and other large fiſhes, are very common in the ſtrata of marle, clay, gravel and ſolid Stone in many parts of the world. Theſe are uſually found ſingle, and the ribs broken off and gone; but they are hollow'd toward the center at each end, and there are uſually ſeen the veſtiges of the ſeveral inſertions of other parts to them, and of the perforation for the ſpinal marrow. Beſides the vertebræ of larger fiſhes, thoſe which have belong'd to fiſh of ſmaller ſize are alſo frequently found. Theſe are all ſometimes met with unalter'd, except that they are a little decay'd, but more frequently they are of a ſtony hardneſs, having had their pores all fill'd with the matter of the common pebbles. The ſcapula of ſome larger fiſhes has alſo been ſometimes found; and what has given much more light into the knowledge of the figur'd Foſſils, ſo much miſtaken in the infancy of theſe ſtudies, is, that the jaws of the ſeveral fiſhes have been found immers'd in beds of Stone with their teeth in them, which have proved to be the Gloſſopetræ and Bufonitæ, before accounted native Foſſils, and the latter rank'd among the Gems.

Of all other parts of the larger animals, the mouths of fiſhes have given the greateſt variety of figur'd Foſſils to the cabinets of the curious. The peculiar hiſtory and deſcription of theſe belong to the hiſtory of the fiſhes they are a part of, but it may not be improper here to give the figures of the principal kinds, that it may be known what ſort of bodies the writers of Foſſils underſtand by the names they have given them.

The foſſile teeth of fiſhes are known by three names, the Gloſſopetræ, the Bufonitæ, and the Plectronitæ.

The Gloſſopetræ which have had their names from their having been ſuppos'd the tongues,

tongues of ſerpents turn'd to Stone, are now well known to be the teeth of ſharks, being found daily in the mouths of thoſe fiſhes wherever taken: I could therefore wiſh, for the honour of theſe ſtudies, that theſe, when found foſſil, if they muſt have a peculiar name, might be call'd by one more properly expreſſing their nature and origin, *Lamiodontes.*

The ſeveral ſizes of teeth of the ſame ſpecies, and the ſeveral different ſpecies of ſharks, furniſh us with a vaſt variety of theſe foſſil teeth. Their uſual colours are black, blueiſh, whitiſh, yellowiſh, or brown. In ſhape they are uſually ſomewhat approaching to triangular, and ſome ſimple, others tricuſpidate, or having a ſmaller point on each ſide the large one; ſome of them are very long, others ſhorter, and ſome very broad in proportion to their length, others as remarkably ſlender and narrow; many alſo of them are quite ſtrait, but they are not unfrequently met with crooked, and are bent in all the different directions, ſome inward, ſome outward, and ſome ſideways, either to the right or left. Many of them have their edges plain, others are ſerrated more or leſs deeply, and ſome of them are undulated or ſhap'd like the figure of a flaming ſword at their extremities, and more ſlightly ſerrated beſide; they are of as various ſizes as figures, the larger ones being found of between four and five inches long, and the ſmaller of leſs than a quarter of an inch.

They are found with us in the ſtrata of blue clay, and ſometimes in thoſe of other ſubſtances, and are very plentiful in the clay-pits of Richmond and ſome other places. They are very frequent alſo in vaſt numbers in Germany, but no where ſo common as in the iſland of Malta.

The *Bufonitæ*, are another ſet of the teeth of fiſhes. Theſe have had their name from their having been ſuppos'd by the firſt writers on theſe ſubjects to be generated in the Toad. But for the honour of theſe ſtudies I wiſh theſe may hereafter alſo be call'd by a name more properly expreſſing their true nature and origin; and as we now know them to be the teeth of the Lupus Piſcis or Wolf fiſh, would wiſh they might be call'd *Lycodontes.*

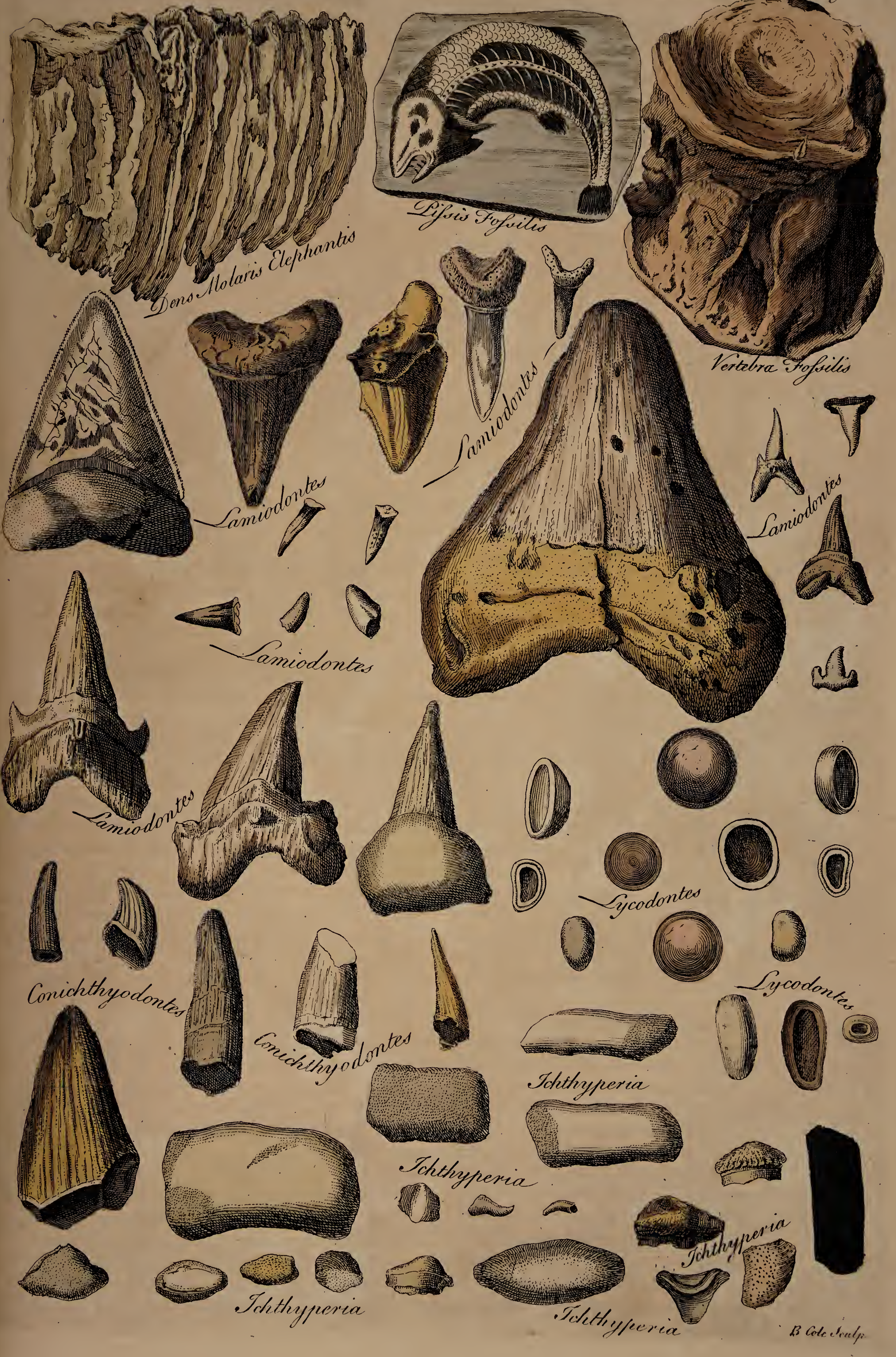
Theſe have been by ſome taken for mere Stones, and rank'd among the Gems. They have been found, however, exactly of the ſame ſhape and form with the teeth of the recent fiſh in many inſtances, and are not unfrequently found in the jaw immers'd in Stone. They are the Dentes Molares or grinders of this fiſh; but I believe not only of this, but that ſome of them as well as ſome of the Lamiodontes, may poſſibly be found to belong to other fiſh, when the hiſtory of thoſe animals is more accurately enquir'd into, with a particular view to theſe diſcoveries.

The Bufonitæ are of different ſhapes, tho' all approaching to the ſame general form. The more common kind is rounded riſing into a ſemiorbicular form, and hollow'd within; this ſomewhat reſembles a ſmall acorn cup, and its hollow is like that of the other kinds, ſometimes found empty, ſometimes fill'd up with the matter of the ſtratum in which it is immers'd. Another ſort of them are of an oblong figure, but ſtill rounded at top; theſe have been ſuppos'd to reſemble a ſmall boat in ſhape, and are ſome of an equal diameter all the way, others ſwell out a little in the middle, and many at one end; ſome of them are found more rais'd in the middle, and ſome even emulating a conic form: They are moſtly more or leſs hollow'd, but ſome kinds ſo little that it is ſcarce to be perceiv'd, and others abſolutely not at all; ſome alſo have been found hollow'd at top as well as at bottom. Many of them have an outer circle of a different colour from the reſt, and this is ſometimes ſtriated with very fine lines; ſome are alſo found very long in proportion to their breadth, and in ſome degree reſembling the bodies call'd Siliquaſtra, and others perfectly round; but theſe are more rare.

Theſe are almoſt all naturally of a fine poliſh, and are worn in rings, without any addition to it from the workman; but ſome of them have been found a little rough and unequal, and ſome few ſtriated. They are of various ſizes, from that of a pin's head to ſuch as meaſure between two and three inches round, and are of a great variety of colours. Some are black, others brown, many of a bright cheſnut colour, many of a liver colour, ſome of a reddiſh black, and ſome whitiſh.

They are uſually of one ſimple colour, but ſometimes beautifully mottled and variegated; the yellowiſh ones are often found irregularly mottled with black, ſome of them are edg'd round with a circle of a different colour, and others have a beautiful ſpot in the center, ſurrounded with a number of circular lines; theſe are of all others

FOSSILE TEETH, PALATES, VERTEBRÆ, & WHOLE FISH



B. Cole Sculp.

the moſt elegant. They are found in many parts of England, but more plentifully in Germany, and moſt of all ſo in the iſland of Malta.

They are with us uſually found bedded in Stone, in Germany they are often found in a blue clay, and in Malta in the medicinal earth of that iſland, among which I have at times receiv'd ſeveral of them under the name of Serpents Eyes.

The *Plectronitæ*, have had their name given them by Mr. *Lhuyd*, from their reſemblance to the ſpur of a fighting cock; but as this name carries with it no idea of the nature or origin of the body, it were to be wiſh'd it might alſo be chang'd.

Our imperfect knowledge of the hiſtory of the fiſh kind cannot, however, give us yet a power of naming theſe ſo perfectly as the others. We are well aſſur'd that they are, however, the teeth of a fiſh, the jaws having been found with theſe bodies in them; but as we yet know not to what fiſh they belong, we can only at preſent name them the *Conichthyodontes.*

They are of ſeveral varieties of ſhape, but all keep to the ſame general form, which is an oblong conic figure, broad at the baſe, and narrower at the point: They are ſometimes perfectly ſtrait, but more uſually a little crooked; often they not unaptly reſemble the beak of a bird, and ſometimes approach to the figures of the ſlenderer Lamiodontes, and ſometimes to that of the Belemnitæ, being like thoſe bodies hollow'd at the root; ſome of them go to a perfectly ſmooth round point, others are edg'd or ſharpen'd on each ſide near the end; and in ſome theſe edges run all the way down the tooth: Sometimes alſo they emulate a ſquar'd and pyramidal figure, and ſome of them are found with very broad baſes very ſhort, and with their points rounded off as if worn down by long uſe. They are ſometimes ſmooth and gloſſy as the *Lamiodontes* on their ſurface, but their much more uſual kinds are ridg'd longitudinally from top to bottom, with ſome deeper, ſome finer ſtriæ. They are plainly of the ſame bony ſubſtance with the Bufonitæ, and ſometimes, though rarely, are found with their roots: They are of various ſizes, from a tenth of an inch to two inches long, and are uſually of a cheſnut colour, though ſometimes whitiſh or blueiſh, and ſometimes perfectly black. They are ſometimes found in the ſtrata of Clay, but moſt uſually in thoſe of Stone, and ſeen more frequent in England than in any other part of the world.

The bony palates and mouths of ſome fiſh afford us alſo a great variety of figur'd Foſſils. Theſe however are all compriz'd under one general name given them by Mr. *Lhuyd*, which is the Siliquaſtra. As this, however, has no more analogy with the nature or origin of the body, than the Gloſſopetra, Bufonitæ or Plectronitæ, I cannot but offer a more expreſſive name alſo for theſe bodies, and wiſh they may hereafter be call'd *Ichthyperia.*

Theſe have plainly all of them been the bony coverings of different parts of the mouths of certain fiſh of the cartilagineous and other kinds, whoſe food being ſhell-fiſh, theſe bones were neceſſary to the eating them; and many of them are plainly found worn by uſe. They are ſometimes found in congeries, as they were plac'd in the mouth of the fiſh, but this is very rare; we uſually meet with them either in ſingle pieces or in fragments of ſuch.

They are of the ſame ſubſtance with the Bufonitæ, and are of very various figures, according to the ſpecies of the fiſh, and part of the mouth they have belong'd to; the ſame fiſh, very probably, having furniſh'd us from the middle and ſides of its mouth, with different ſhap'd Ichthyperia.

Their uſual figure is that of half the ſhell of the pod of a Lupine or other leguminous plant, according to the ſeveral ſpecies; fill'd up with a ſtony matter. Their principal varieties are theſe: ſome are found of the ſhape of half the Lupine pod; theſe are the moſt common; others of that of the pea, and others of that of the kidney bean. Some of them are broad and ſhort, others longer and ſlenderer; ſome very gibboſe on the back, others plainly arch'd, and the ſeveral kinds are at times found more or leſs flat. Some of them are crooked at the end, others wreath'd, or as it were gently twiſted; ſome approach to a triangular, and ſome to a rhomboidal form; ſome are roundiſh and flatted, and others very prominent in the middle, and many of them reſemble in ſome degree the Bufonitæ. They are of various ſizes, from the tenth of an inch to two inches in length, and an inch in breadth; and are ſometimes of a perfectly ſmooth and polite ſurface, but more frequently they are finely ſtriated or ſinuated, and ſometimes cover'd all over with ſmall tubercles. Their colours are extreamly various, they are moſt frequently black, or of a dark and blackiſh cheſnut colour; but they are ſometimes found greeniſh, blueiſh, yellowiſh or whitiſh, and ſometimes, though rarely, ſpotted with different colours.

They are found lodg'd and bedded in the ſtrata of Stone in Germany, Italy, France, in the iſlands of the Archipelago, and in Syria, among the ſpines of Echini; but they are no where ſo frequent as in England, there being with us very few quarries but afford more or leſs of them.

Of FOSSILE SHELLS.

Theſe make greatly the larger number of the animal bodies bury'd in the earth, and are the greateſt ornaments of the cabinets of the curious, but they have of all the others the leaſt title to deſcriptions in this work, as they belong wholly to the animal kingdom, and are there to be deſcrib'd from ſpecimens much more fair and perfect than can be found in the Foſſile world.

Of theſe we have ſome remaining almoſt entirely in their native ſtate, others are variouſly impregnated with ſtony and other particles; in the place of others we have mere Spar or Stone, exactly expreſſing all their lineaments, as having been form'd wholly from them; the Shell having been diſſolv'd by very ſlow degrees, and this matter left in its place; or the cavities in Stone, out of which the Shells had periſh'd, having been afterwards fill'd nicely up with theſe ſubſtances, which could therefore appear in no other but the perfect form of the periſh'd Shell. In many places alſo we have maſſes of Stone form'd in various Shells, and theſe having, while in a fluid ſtate, nicely and exactly fill'd the cavities of the Shells, muſt be after the Shells are periſh'd from their ſurfaces exactly and regularly of their internal figure.

The various ſpecies we find of theſe are in many genera as numerous as the known recent ones; and as we have not only in our iſland the Foſſile Shells of our own ſhores, but thoſe of many other very diſtinct ones; ſo we have alſo many very numerous among us, which are the product of yet unknown, or at leaſt unſearch'd ſeas and ſhores.

Of the bivalve Foſſil Shells, the ſame with the ſeveral ſpecies now known upon our own and other ſhores, the moſt frequent are the Pectunculi or Cockles, theſe we find Foſſile in great abundance in the ſtrata of Stone, and in ſome others. The moſt frequent and numerous of theſe are of the roundiſh and ſmooth kind; numbers of the ſpecies of which we find very frequently in Glouceſterſhire and Northamptonſhire. In the neighbourhood of Bath, in ſome parts of Yorkſhire, and about Peterborough and Northamptonſhire, I have met with great numbers of the longer ſhap'd cockles, theſe are uſually pretty deeply ſtriated, ſometimes furrow'd from the cardo to the end. Some few of them are ridg'd acroſs with large broad and prominent faſciæ; and ſome both tranſverſely and longitudinally ſtreak'd with lines as fine as a hair. In many parts of Somerſetſhire that kind call'd by authors Trigonella, is very common in the ſmaller ſpecimens; and there are a few large ones ſome four or five inches round, all immers'd in Stone. This kind of cockle approaches to a triangular figure, having a broad bottom to which it deſcends on both ſides almoſt in ſtrait lines from the head or cardo. In many parts of the ſame county, and in Leiceſterſhire, and indeed in almoſt all the other counties of England, we have abundance of the more common kind of the ſhorter cockles; of theſe ſome are ſtriated longitudinally, ſome tranſverſely, and not a few both ways; and in ſome the lines are very fine and ſmall, in others very broad: Many of the larger cockles furniſh us alſo with what authors call *Bucarditæ*; theſe are a ſtony or other matter form'd in the cavity of the Shells, and thence neceſſarily reſembling in ſome ſort a heart at cards. The Curviroſtra of authors are alſo Shells of this kind, ſo nam'd from the beak ſtanding not in the middle of the Shell, but always inclining to one or the other ſide; and the Hippocephaloides or Horſe's Head Stone of Dr. *Plot*, is a caſt in a Shell of this kind of the nature of the Bucarditæ.

The oyſter-ſhells are alſo very common with us; about Woolwich we find vaſt plenty of the common kinds; and the tree oyſter, as it is call'd, diſtinguiſhable by the indentings of its edges, is very frequent in Somerſetſhire, Yorkſhire, and many other places in Stone. The Shell of the common oyſter is found to vary much in ſhape in its recent ſtate, and it has not leſs irregularities in the Foſſil world; and there are ſome varieties which may well be eſteem'd diſtinct ſpecies. The Lapis Auricularis or Ear Stone of Dr. *Plot*, is a mere foſſil oyſter, and in Berkſhire and ſome other counties, we meet with

Plate 9

FOSSILE SHELLS

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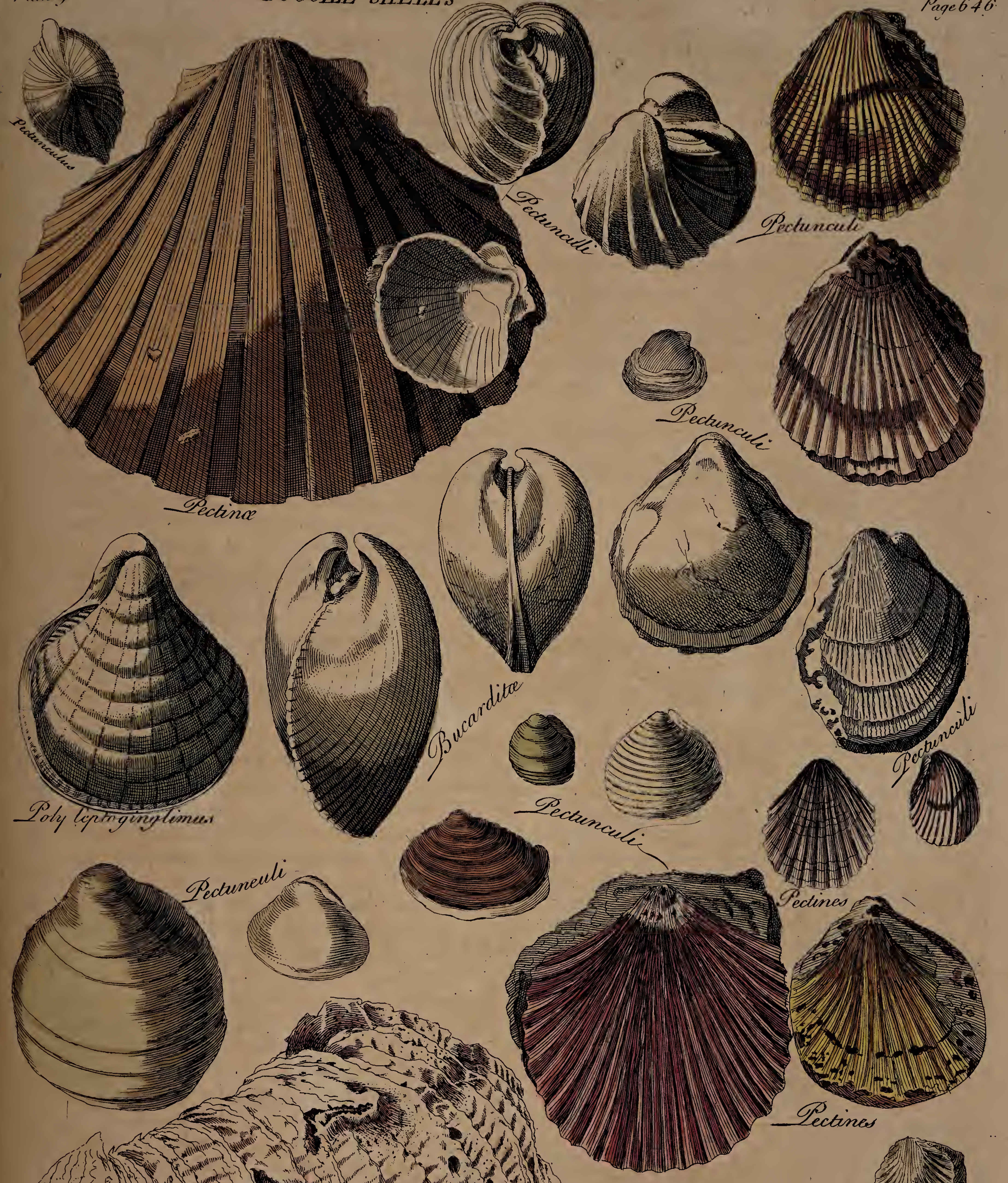

with Shells remarkably long, and ſome hooked at the end, ſome are found extreamly ſmall; and the Hæretula, the Strigoſula, and the Strigoſularaſtellata of Mr. *Lhuyd* are all of this kind of Shell. The ſmall oblong and thin ones, compar'd by authors to a cow-parſnip-ſeed is very frequent about Peterborough, and is a very pretty Shell. The Oſtracitæ of authors are with ſome the petrify'd Shells, with others the Stones form'd in the Shells of the ſeveral ſpecies of oyſters.

The ſcallop or pecten is alſo very frequent in many of our midland counties, ſometimes we find the pairs but oftener only a ſingle Shell. Of theſe there are about Rowell in Northamptonſhire, ſome of a ſhorter and others of a longer kind, and many perfectly diſtinct ſpecies are found in Leiceſterſhire and Somerſetſhire, almoſt as many, I think, as at ſea. We have ſome either perfectly ſmooth, or ſo very finely ſtriated, that the lines are not viſible; others deeply ſtriated, others ridg'd and furrow'd alternately, ſome only mark'd with fine longitudinal ſtriæ, and others beautifully mark'd alſo with tranſverſe lines rang'd in circular figures. The ears, as they are call'd, on each ſide the head of the Shell, are in moſt equal in ſize, but in ſome they are much larger and longer on one ſide than on the other.

Theſe are uſually found in Stone pits, and are highly impregnated with, if not wholly compos'd of the matter of the Stone of the quarry.

The Sphondyli, which are very nearly ally'd to the ſcallops, but are diſtinguiſh'd by having indented hinges, are a very rare Foſſil; we ſee them, however, in Dorſetſhire and ſome other counties.

The Ctenita, or Ctenoides, is alſo nearly ally'd to the Pecten, and differs principally in having one of its Shells very convex, but flatted on the top, and its head or beak crooked. Of theſe we have ſome ſpecies in Glouceſterſhire, but they are much more frequent in Germany.

The Conchæ Margaritiferæ or pearl ſhells, are rare with us; but in the hills of Germany there are found multitudes of them, from the ſize of a half crown to ſix or ſeven inches in diameter. I have twice met with them here in the ſtone pits near Peterborough and at Mount Sorrel, they are alſo found in Glouceſterſhire.

Of the Leptopolyginglimi, diſtinguiſh'd by a number of minute teeth at the cardo, we find very great numbers at Harwich cliff, and in the marle pits of Suſſex.

The Tellinæ have ſomething of the muſcle form, and are much longer from one ſide to the other than from the hinge to the margin. Of theſe we find vaſt numbers at Woolwich, and in almoſt every county of England; they are of various ſpecies and kinds, ſome have the Shell perfectly remaining alſo, and others have it either wholly gone and the Foſſil naked, or have a cruſt of Spar in its place: Theſe are uſually found looſe or bedded in the ſofter ſtrata of Earth; ſome of them are ſmooth, and ſome of them are flatted, others more convex and elevated, and others are ſtriated, either longitudinally from the cardo to the margin, or with circular lines; theſe laſt are call'd the faſciated ones. We have of both theſe kinds in Kent and Eſſex, and in Glouceſterſhire, and many other counties, of all ſizes up to three inches, and ſome much longer in proportion to their breadth than others, ſome more deeply, others more lightly ridg'd.

Somewhat ally'd to theſe are the *Cunei*, which have one ſide of their Shell much more extended in length than the other. Of theſe alſo we have prodigious abundance looſe on the plough'd lands in Northamptonſhire, Somerſetſhire and Glouceſterſhire; and theſe partly ſmooth, partly ſtriated, and many faſciated, or mark'd with circular rings. Some of theſe are found alſo in Eſſex, and vaſt numbers at Woolwich; thoſe at Woolwich all have the Shells remaining, which is leſs common to thoſe in other places.

Muſcles of various ſpecies are frequent alſo in the ſtrata of Earth, and ſometimes are found in Stone; they are diſtinguiſh'd from the reſt by being much longer from the cardo to the edge than from ſide to ſide. We find the Eaſt and Weſt Indian kinds, as well as thoſe of our own ſhores, thus bury'd with us. The common ſmooth Muſcle and a ſmaller kind lightly ridg'd are frequent. And we ſometimes meet with a very large one, broad at the extremity, and very thick, and often with that long and narrow one, call'd by Lhwyd the longiuſculus anguſtior. And ſometimes we find the great broad cheſnut colour'd muſcle of Liſter, which not a little reſembles the Pinna-marina.

The *Pinna-marina* is alſo ſometimes found with us, but more rarely, this is not only diſtinguiſh'd from the muſcle by its ſize; but by its being very narrow at the head, and thence gradually becoming broader to the very end, where it is of a great breadth. We have of theſe from four to twelve inches long, and ſome are found ſmooth, but moſt with the longitudinal ſtriæ and prominences of the natural Shell; and I have one of a fine tranſparent ſubſtance like that of the Belemnitæ, and compos'd of parallel tranſverſe fibres, as that body always is, and as the Shell of this fiſh is alſo in its native ſtate.

The *Chamæ* are found about Sheppon Mallet in Somerſetſhire, but in very ſmall numbers; they are uſually very flat and very lightly faſciated.

The *Solen* or Raſor-Fiſh, is ſometimes found with us, but not ſo common as the reſt. I ſaw one ſpecimen tolerably perfect, at Mr. Allen's ſtone-quarries at Bath, and have ſeen in Somerſetſhire the remains of them but without the ſhell.

The *Balani Marani* are found large and looſe, ſometimes ſingle, ſometimes in cluſters, bury'd in the ſtrata of earth in many parts of America. I have only once found a large one in England, which was in a clay-pit near Loughborough in Leiceſterſhire. The ſmaller are frequently found affix'd to other bodies, and are not uncommon with us on ſhells and the foſſil Corals.

The *Pholades* are a very rare foſſil-ſhell, tho' frequently found about the ſea ſhores, bury'd while recent in cavities of a very ſingular ſtructure in ſtone. They are, however, found alſo foſſile in the marle-pits of Suſſex, and in Harwich Cliff, and ſome other places.

Of the other Genera of ſhells, we have ſcarce leſs numerous ſpecimens in the foſſil world than of the Bivalves.

The *Tubuli Marini*, caſes and ſhells of marine Vermiculi, are extreamly plentiful with us in their foſſil ſtate and are of ſeveral kinds; we meet with them of very various ſizes and in various ſtates, ſometimes they are complete and bury'd in the ſtrata of earth or ſtone; ſometimes they are more or leſs perfect, and bury'd in maſſes of the Septariæ or Ludus Helmontii, theſe make one of the ſorts of what is call'd *Lapis Syringoides*; but the moſt beautiful and perfect Syringoides are of wood pierc'd as the bottoms of ſhips by ſea-worms, with their ſhelly caſes left behind them in it. And the wood is found in theſe more or leſs alter'd ſince the time they were laid there; ſometimes wholly petrify'd, ſometimes wholly fill'd with the matter of the common Pyrites, as is the caſe with all that in the clay-pit at Richmond; but very often it is found in its native condition or very little alter'd, and then ſhews its true origin. Of this kind there is much at Sheppey-Iſland lodg'd in the cliffs and looſe on the ſhores; and many ſpecimens I collected there the laſt ſummer, are as plain oak, as a common oak board, having the true texture and every character of the wood, and the whole juſt in the condition of the ſtumps of wood ſtanding in the ſea, or the bottoms of ſhips eroded by theſe vermiculi.

The *Dentalia* and Entalia are frequent alſo among us, ſmall ſmooth ones are common in ſome of our clay-pits about London; and the larger ſtriated ones are found not unfrequently in the hills of Yorkſhire, but in much greater abundance in the mountains of France and Italy.

The *Neritæ* are not unfrequent in many parts of England; in Somerſetſhire we find many, and not a few in Leiceſterſhire and Northamptonſhire, all either naturally looſe or bedded in the laxer ſtrata; theſe are uſually of the kind very common on our own ſhores; but in Dorſetſhire there is another larger kind common in ſtone; and the green marbles, and ſome of the Purbeck Stone are frequently found to contain ſeveral ſpecies of them.

The *Cochleæ* of various kinds are as common as any foſſil ſhell we have; we find ſome more elevated at the top, others more flat and depreſs'd, and ſome of three, ſome of four, and others of five Volutæ; theſe are the more common. The ſhell is remaining on many of theſe, but the far greater numbers are only caſts of ſtone in the ſhell which has periſh'd ſince; we find them in great plenty in Staffordſhire, Northamptonſhire, Leiceſterſhire and Eſſex; the iſle of Sheppey alſo affords ſome, but the great ſtore of theſe as well as of other foſſil ſhells is in Glouceſterſhire; we there not only find moſt of the ſpecies of our own ſhores, but many of thoſe of other countries.

The Buccina, Cylindri, Trochi and Rhombus's, we alſo find in conſiderable abundance, and of a vaſt variety of ſpecies.

The Buccina are diſtinguiſh'd by their roundiſh aperture. Their Trochi by their approaching to the figure of a cone, broad at the baſe and taper'd to a point. The Rhombus's by their oblong, and the Cylindri by their Cylindroide figure; of theſe the

Buccina

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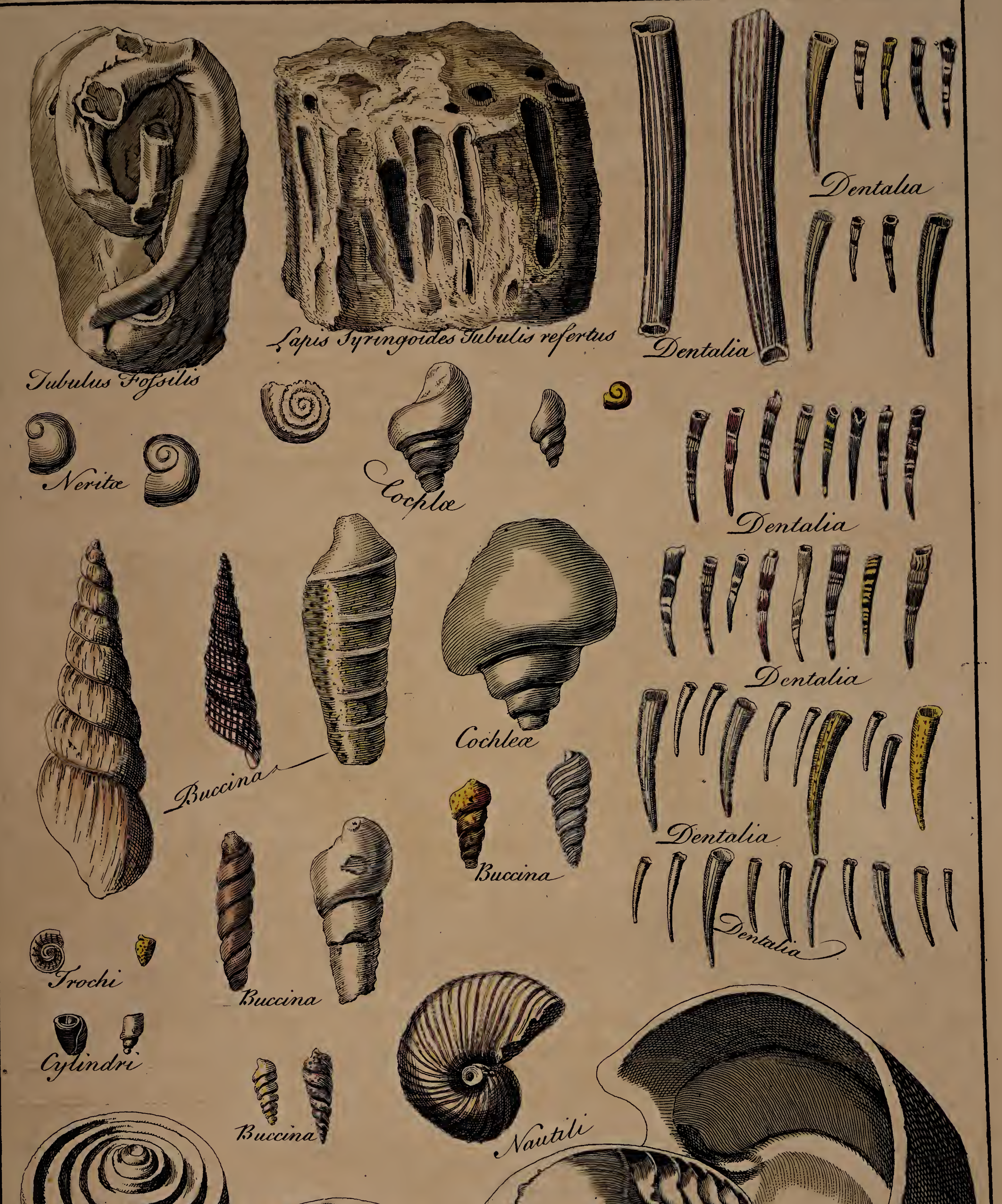

B. Cole Sculp

Buccani are the moſt numerous, and furniſh us with the greateſt variety of ſpecies, even ſcarce leſs numerous than the recent ones on our own and other ſhores. At Woolwich we find theſe in beds of earth, lying in vaſt abundance, and all in their native ſtate; on the ſhores of Sheppey Iſland, and in our own clay-pits about London, we find them extreamly abundant with the ſhells periſh'd, and the whole body form'd of the common vitriolic Pyrites; and in Glouceſterſhire, Somerſetſhire, and Northamptonſhire, they are found of a ſparry or ſtony matter, and ſometimes looſe, ſometimes bedded in the ſtrata of ſtone.

The Trochi are ſcarce leſs various in ſpecies than the Buccina; ſome are ſpirally ſtriated with deeper or finer ſtriæ, ſome ſmooth, ſome prickly, ſome ſtudded with little round tubercles, and ſome circularly ridg'd; of theſe, as well as of the Buccina, ſome are found Foſſil, whoſe mouths open the contrary way to the more common ſpecies.

The *Cylindri* are found alſo of ſeveral ſpecies, with more or leſs numerous volutæ, and ſome are found ſmooth, others ſtriated in ſpiral, and ſome in circular lines. Theſe are moſt numerous in Glouceſterſhire and Somerſetſhire, but are ſometimes found in Kent and Eſſex.

The Rhombus's are uſually found ſmall and nicely ſtriated; they are leſs frequent in England, but in Germany are found in vaſt abundance.

The Limpit or *Patella*, tho' ſo very common a recent ſhell, is very rarely found foſſil; there are two or three different ſpecies of it, however, met with in Somerſetſhire, and one in our own clay-pits about London, tho' very rarely.

Of the Nautilus kind we have a ſurprizing plenty, particularly of the Nautilus Græcorum, a ſhell not found on our own or any other neighbouring ſhores; yet bury'd in the ſtrata of earth in almoſt all parts of the kingdom. Our clay-pits about London have furniſhed me with many ſpecimens of them, particularly that behind St. George's Hoſpital at Hyde-Park Corner, where they are found conſiderably large. The cliffs and ſhores of the iſland of Sheppey abound with them; ſome looſe in the clay, ſome bedded in the Septariæ; and our ſtone-pits as well as thoſe of clay, in moſt counties afford many of them. The ſeveral cells, diaphragms, and ſiphunculus, or pipe of communication in moſt of theſe are very plain.

But beſide this kind, we have ſome others which have undulated or ſtudded ſurfaces; and in the clay-pit behind St. George's Hoſpital that beautiful ſpecies call'd Nautilus Armatus, or the Maild Sailor, is very common.

Of the ſhells, either the whole genera of which, or at leaſt many of the ſpecies, are now wholly unknown to us in their recent ſtate. The Ammonitæ, Conchæ Anomiæ, and Echinitæ; furniſhes a prodigious variety. The firſt of theſe are parted into cells like the Nautili.

The Ammonitæ or Cornua Ammonis, call'd ſerpent ſtones by the vulgar, ſeem plentifully diſpers'd throughout the world, and ſcarce any where are found in more beauty, plenty, and variety than in England. Dr. Woodward's collections of theſe, the Anomiæ and Echinitæ were very great; and his arrangements of them, tho' not wholly faultleſs, yet of great merit and value.

We find the Ammonitæ of all ſizes, from the breadth of a ſix-pence, or even leſs than that, to more than two foot in diameter; ſome of theſe are rounded, others greatly compreſs'd, and we meet with them lodg'd in the various ſtrata of earths and ſtones.

Some of them repreſent the nave of a cart wheel; and ſome of theſe are plain, others ſtudded; ſome are wholly ſmooth and free from ridges, others have ridges more or leſs broad; and of theſe, ſome only reach acroſs the ſides without going to the back, others paſs the back and are continued lines going quite round the ſeveral Volutæ of the ſhell, and ſome are ſtudded at their ends. Some have ſimple, others bifurcated ſtriæ, and ſome are ſtudded and umbilicated; and others, both of theſe and of the Nautili, have a ſort of foliaceous work about their ſutures, giving a great beauty to the whole. Some alſo have a high ridge running all the way along the back, which in ſome is plain, and in others it is denticulated, and of theſe ſome have a furrow on each ſide of this ridge, which others want, and ſome have elegant rows of ſtuds on each ſide of the furrow; and other ſpecies have only a ſingle furrow running along their backs.

Theſe all conſiſt of ſeveral Volutæ, different in number in the different ſpecies, and their ſtriæ are extreamly various, ſome very deep, and the ridges high between them, others very ſlight; ſome ſtrait, others irregularly crook'd, others undulated, and ſome terminating in dots, tubercles or cavities toward the back, and others having tubercles in two or three places.

The *Orthoceratitæ*, are of the number alſo of the concamerated ſhells, or ſuch as are divided into a number of cells, by means of diaphragms, and have between each a ſiphunculus or pipe of communication; theſe are uſually ſtrait, ſometimes a little twirl'd at the end; they are all large at one end and gradually taper to the other. Theſe are very common in the ſtrata of ſtone in Germany and Sweden, and we frequently ſee beautiful ſections of them in the ſtones of the pavements made with the Swediſh kind. The great ſquare of Chelſea-College near the rails at the bottom, furniſhes many very beautiful ſpecimens of it.

The *Concha Anomiæ*, are of all foſſil ſhells the moſt numerous in many of our counties; in ſeveral of which, particularly in Glouceſterſhire, they lie as plentifully as pebbles with us on the ſurfaces of ploughed lands; of theſe there are a number of different genera and ſpecies.

The ſhells we generally agree to call by this name are Bivalves. The Valves of which are of unequal extent, both of them convex, and the head or beak of the longer Valve crooked, and falling over the head of the other.

Theſe are an extreamly numerous claſs of bodies, and their firſt natural and moſt obvious diſtinction, is into thoſe which are of a ſmooth, and thoſe which are of a rough ſurface.

Of the ſmooth ones we find very numerous ſpecies, ſome are rounded at the margin, others crenated, others deeply ſinuated, and others corner'd on each ſide, and ending in two angles, with a broad and flattiſh ſurface between them. Of thoſe whoſe margin is rounded, we find many with thick, and others with thinner edges; ſome broad and flattiſh, and others ſo convex on each ſide as to emulate an oval form. Moſt of theſe have rounder and blunter beaks than the other kinds; and theſe are frequently bor'd with a hole at the ends as if done by art. Theſe are the Terebratulæ of Mr. Lhuyd. Of thoſe with the corner'd margin, ſome are thicker in the middle, and others at the end or rim, and others have a ridge running down the middle of the back.

Of thoſe which are ſtriated from the cardo to the margin, we have alſo very numerous ſpecies, in ſome the lines are ſlight, and in others they make deep ridges and furrows. Theſe have generally a ſharper beak than the ſmooth ones, and are like them various in ſhape of the margin, ſome having it plain and ſmooth, others lightly, and others more deeply ſinuated and corner'd; in the more common ſpecies of theſe, the middle ſegment of the longer Valve is depreſs'd and ſunk into a kind of hollow, and running out in length beyond the corners, bends round the margin, and meets the depreſs'd middle part of the oppoſite Valve, which is much ſhorter. Some of theſe are of a more convex, others of a more flatted figure, and ſome have their ridges and furrows much more numerous than others; in ſome there being only one to the middle ſegment or depreſs'd part of the ſhell.

Others of the ſame claſs or one nearly ally'd to it are alſo found; ſome very long from the cardo to the margin, and others very long the contrary way, or from edge to edge.

We find theſe in all ſorts of ſtrata; in earth, in ſtone, in ſand, and among gravel.

The *Gryphites* of authors is an oblong foſſil-ſhell very narrow at the head, and gradually becoming wider to the extremity where it ends, in a circular limb; the head or beak of this is very hooked or bent inward. This has been call'd by ſome the Conchites Anomius Rugoſus; by others they are nam'd, Conchæ Rugoſæ, and in Engliſh, Crows-Stones. We have them very frequent in our gravel and clay-pits in many of our counties, and have three or four diſtinct ſpecies of them; ſome are extreamly rounded and convex on the back, others leſs ſo; and the plates of which they are compos'd, are in ſome ſmaller and thinner, in others thicker and larger in ſpecimens of the ſame bigneſs.

The *Echini Marini* alſo afford us an almoſt endleſs variety in the foſſil world; many of the ſpecies we find in our clalk-pits, *&c.* are the ſame with thoſe now known to us at ſea; but we have numbers of others, of which our imperfect knowledge in the animal world gives us no account in their recent ſtate. The ſhells of ſome of theſe are found; in many others, Spars filling the place of the ſhells; but their moſt frequent appearance is in form of maſſes of hard flint, which have been caſt and form'd in them, and ſometimes pure cryſtal, often cryſtal but ſlightly debas'd by earth is found in the place of the flint; theſe make extreamly elegant ſpecimens.

The ſagacious Klein has done a great deal toward the ranging the Echini marini into their ſeveral claſſes; but it is not impoſſible to give a yet more full and regular method of

Plate II

FOSSILE SHELLS

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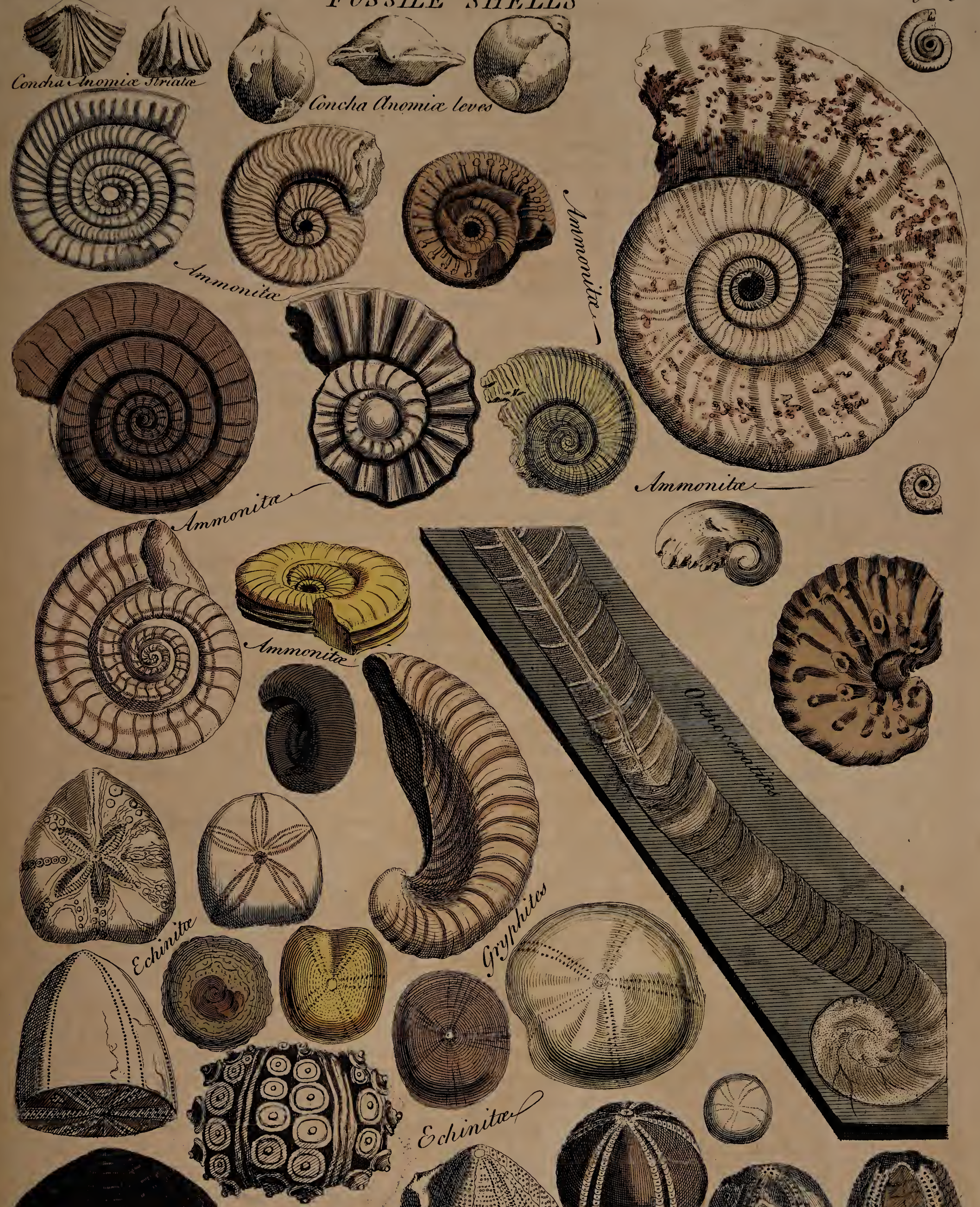

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of them, founded on their more eſſential diſtinctions; this however is the buſineſs of a hiſtory of animals. What we find foſſil are uſually known among writers by the names of Spatagi, Cordati, Galeati, Pileati, Diſcoides, Ovarii and Pentaphylloides.

What we underſtand by the general names of Echini and Echinitæ, are arch'd ſhells or ſtones form'd in ſuch, cover'd with diverſe eminences and cavities, ſome of them diſpos'd into beautiful lines diverging from the ſummit, and always having two apertures, one for the mouth, the other for the anus of the animal.

The Echini *Cordati* are ſuch as have a remarkable furrow on one ſide or end, which is uſually broader than any other part of the body, and by means of this furrow repreſents a heart at cards.

The *Galeati* are ſuch as have the baſis ſomewhat oblong; and the apertures, one in the very margin, and the other near the margin on the oppoſite ſide; the Pileati and Diſcoides are ſubdiſtinctions of this kind.

The *Pileati* are higher, and approach to a conic figure.

The *Diſcoides* are flatter and more compreſs'd.

The *Ovarii* have only one aperture at the baſe, and have large and unequal Tubercles and Papillæ.

The *Pentaphylloides* have rows of ſhort lines, which are ſo diſpos'd as to repreſent a cinquefoil leaf.

The *Spatagi* is a very comprehenſive term, taking in moſt of the others as ſubdiſtinctions; it comprehends all that have two holes in the baſe, and are cover'd with ſmall tubercles.

To theſe naturally ſucceed the cruſtaceous animals, Crabs, Lobſters, and the like. The tail part of ſome of the Lobſter kind is found foſſil, but uſually very imperfect in our clay-pits about London; and whole Crabs very perfect are dug frequently in China, Perſia, and other parts of the Eaſt; nor are we wholly without them. The iſland of Sheppey has furniſhed the ingenious Mr. Jacob of Feverſham with a very perfect Specimen; and Mr. Da Coſta has met with a ſmall one in the clay-pit behind Shoreditch Church. Theſe, however, are very rare.

The *Stellæ Marinæ* are yet rarer Foſſils than theſe when in a perfect ſtate; but bodies not unaptly ſuppos'd to have been parts of ſome of the ſpecies of this animal, are very frequently found. Theſe, however, muſt have their place among the leſs known Foſſils, till a more perfect knowledge of the animal hiſtory, acquaints us with what part of what ſpecies they really are.

Of thoſe Foſſils which we are not yet able certainly to reduce to their kindred animals, and of many of which, we are not yet aſcertained whether they are the remains of whole animals or only parts of them, we have a very great variety.

The *Belemnites*, or thunder bolt as it is uſually called, is of this kind; its nature and origin have long exerciſed in vain the wits of the inquiſitive and curious parts of the world; nor is it eaſy to ſay whether moſt has been urg'd in favour of its being of marine and animal origin, or of its being a mere native foſſile ſubſtance: on a careful review, however, of all that has been ſaid on both ſides the queſtion, the arguments for its being the remains of an animal body appear the moſt ſatisfactory, and obſervation favours that opinion.

Theſe are of ſeveral kinds, ſizes and figures, but all of the ſame determinate internal ſtructure; and many of the figures we find this Foſſil is ſuppos'd eſſential to it, ſeem rather the effect of external accidents and injuries, and its general natural figure to be conic.

The *Belemnitæ*, are all compos'd of ſeveral thin coats or cruſts encircling one another, and all of a ſtriated texture; they have uſually a hollow in the middle, tho' ſeldom exactly ſo, but uſually more on one ſide; this is of a conical ſhape, and is ſometimes empty, ſometimes fill'd up with earth and ſtone, and often with a marine ſhell of the ſtrait concamerated kind, call'd by authors its Alveolus; tho' this ſhell is not only found in the Belemnites, but often looſe, and thoſe much larger than we could expect to find Belemnitæ to be matrixes for; and the inſide of the cavity of the Belemnites is frequently found mark'd with parallel circles, a ridg'd one and a furrow'd one, adapted to the ſhape of the concamerated ſhell which makes the Alveolus.

The *Belemnitæ* have uſually a ſingle rima or chink running down, in form of a ſtrait crack the whole length of the body, or nearly ſo; ſometimes they have two or three of theſe chinks, but the additional ones uſually begin at the Apex of the Stone, and run up but a little way; and ſome have no obſervable chink at all.

Beſide the conic Belemnitæ, ſome are cylindric or nearly ſo; and ſome are thickeſt near the middle or near one of the ends, and taper off to a ſort of point at both, ſome are of all the intermediate figures between conic and cylindric, and ſome almoſt orbicular; ſome gradually taper off, others more abruptly, and ſome have no cavity; there are many other figures in which they are found, but till we perfectly know the hiſtory of what animal they have belonged to, it is impoſſible to ſay which of theſe are natural, which accidental figures owing to injuries.

Of the conic ones, ſome are nearly rounded, but more uſually they are flatted on one ſide, ſometimes on the two oppoſite ſides, and ſometimes they are plainly cruſh'd and crack'd by accidents, as other foſſile animal ſubſtances frequently are.

They are of various ſizes, from a quarter of an inch to eight inches in length, and tho' always of the ſame matter and ſtructure, are of various degrees of colour, ſome being of a fine amber colour, others blackiſh, others of a blueiſh grey, others of a darker or paler brown, and others of a cheſnut colour; and they have a very peculiar ſmell when ſcraped.

They are found in all ſorts of ſtrata, ſometimes in clay, ſometimes among gravel, often immers'd in beds of ſtone, often in looſe flints; and are ſometimes found cover'd with a ſparry cruſt, ſeeming to have been form'd in the place of the ſhell they were form'd in, and not of the ſame ſubſtance or texture with the body of the maſs; ſometimes alſo *Tubuli marini*, and ſmall Fungitæ are found affix'd to them, but this is more rare; the chap or chink in ſome ſeems only ſuperficial, but in others it may be trac'd to the axis; the cruſts a Belemnites is form'd of ſeem properly ſo many ſmall Belemnitæ encloſing one another. The matter contained in the cavity is perfectly various according to the matter it has been lodg'd among; often Spar, often Pyrites; and the Alveolus when found looſe, is frequently compos'd wholly of Spar, or Pyrites; thoſe Belemnitæ which end in a point at each end, are more rare than the others; and uſually ſeem injur'd and imperfect; in moſt of theſe the crack is ſo fine as to ſeem almoſt wholly obliterated.

Among the leſs known parts of animals, we may reckon alſo the various ſpecies of bodies allow'd to have been *ſpines of the Echini*, tho' many of them have belong'd to ſuch ſpecies of this fiſh, as we have not the leaſt knowledge of; theſe all agree in their texture and conſtituent matter, both with one another and with the matter in the place of the ſhells of the Echini found in our chalk pits; all being compos'd of a plated or tabulated Spar: both theſe ſhells and the ſpines, tho' they retain every lineament of the outer figure of bodies they owe their form to, yet have nothing of their interior texture; they are all compos'd of plates ſet edgewiſe, or aſlant in the ſhells, and in the ſpines always obliquely to the axis of the body; ſo that all the ſpikes break regularly in an oblique direction, and ſhew on each part a perfectly ſmooth, ſlanting ſurface.

Theſe ſpines are found of very different ſhapes and ſizes, ſome are long and ſlender, tapering from a broader baſis to a fine point, and are ſtriated, ridg'd, or furrow'd, and often granulated, tho' ſometimes ſmooth; theſe moſt reſemble the ſpines of ſuch recent Echini as we are acquainted with; but we have others foſſile of very ſtrange figures, ſome are of the ſame length with the common long ones, but are very flat and ridg'd more or leſs high, or cover'd with tubercles of various ſhapes; others are ragged and variouſly jagged and knotted like a rugged branch of fir ſtrip'd of its leaves and branches; or that ſort of fucus called the ſea ragged ſtaff; another very common kind in ſome parts of the world, particularly in Syria, but leſs frequent with us, is the body commonly known among authors by the name of *Lapis Judaicus*; theſe are ſuppos'd in ſome ſort to reſemble an Olive, ſwelling from a ſhort ſtalk, to a large, thick and ſhort body, of an oval figure, and mark'd very elegantly with longitudinal furrows, and in the different ſpecies with differently ſhaped tubercles; of this ſhape there are alſo ſome perfectly ſmooth.

We have great numbers alſo with us approaching to the figure of theſe, but with longer ſtalks and ſmaller bodies, and theſe we have of almoſt all ſizes down to that of a barley corn; and there are found of all the intermediate figures between theſe tumid ones and the firſt deſcribed ſlender ſort.

We have numbers alſo of various lengths, and variouſly furrow'd, and beſet with Granulæ which are thicker either in the middle or toward one of the ends, and like the Belemnitæ of the ſame ſhape taper away to a ſort of point at each end; impreſſions of theſe ſpikes of the ſeveral kinds, are alſo common on our flints in the gravel pits; the ſpines themſelves are moſt uſually found in our chalk pits, tho' ſometimes immers'd in Stone, and ſometimes looſe among our gravel.

The *Entrochi*, are alſo Foſſils of this kind, and have probably been parts of ſome marine animals of the ſtar fiſh, or echinus kind; but our knowledge in the animal world does not yet aſſure us what they truly are.

They are cylindric columns, uſually of about an inch in length, and are made up of a number of round joints, which when ſeparate and looſe as they are ſometimes found, are called Trochitæ; they are all ſtriated, from the center to the circumference, and have a cavity in the middle, which we frequently find fill'd up with matter of various kinds, tho' ſometimes empty; they are compos'd of the ſame ſort of plated Spar with the ſpines and ſhells of the Echini, which is uſually of a blueiſh grey colour, and very bright where freſh broken; they are ſubject to accidental injuries, and are often found compreſs'd and flatted; their joints are not all of the ſame ſize in the ſame ſpecies, but ſome uſually ſwell out much more, and are much larger than the reſt; their cavities in the middle are alſo of ſeveral ſhapes, uſually round, or ſomewhat approaching to that figure, but ſometimes pentangular, or of other numbers of angles reſembling the Aſteria; or a ſlight impreſſion of a pentangular ſtar, is ſeen on each ſide every joint, in which caſe the body is called an Entrocho Aſteria; ſometimes the joints are plain and ſmooth, but very often they have the rudiments of appendages in form of ſmall branches, iſſuing from them in ſeveral places. They are plainly of marine origin, having often ſea ſhells adhering to them, and when theſe are ſeparated the ſhells ſhewing the impreſſion of the Entrochi; whence it is evident, that the Entrochi were form'd and exiſtent in the ſeas when theſe ſhells were in their growth; there are ſometimes found with theſe, larger or ſmaller fragments of plated bodies which have been parts of the ſame animal with the Entrochi, and often the Entrochi are found affixed to them; theſe fragments are ever compos'd of ſeveral ſmall plates of a convex or concave figure, laid in an imbricated manner over one another; the Germans call theſe bodies *Modioli*, but they are ever too imperfect to form any great conjectures of the animal they have belong'd to, from them. With theſe we alſo ſometimes find the inner Nucleus as it may be called of the Trochita, that is the ſubſtance which has fill'd its cavity, with the outer ſubſtance of the Entrochus worn or fallen off; this might ſometimes eaſily be ſuſpected to be a body of a very different kind; at other times this is found more reſembling what it originally was, only the rounded parts of the Entrochus being worn away.

The *Entrocho-Aſteriæ*, as they called, have ſuch elegant ſtarry cavities, and marks, that they often ſeem only Aſteria ſurrounded with ſome foreign matter, and by that ſhap'd into roundneſs.

We find the Entrochi of all ſizes, from that of a pins-head to a fingers length, and the thickneſs of ones middle finger; they are found looſe on plough'd lands, bedded in clay, and very often in ſtones, and the Derbyſhire marble is extreamly full of them, and owes its beauty when poliſh'd principally to them.

The *Volvulæ*, are bodies very nearly allied to the Entrochi, being like them cylindric columns made up of ſeveral joints; but the commiſſures of the joints are leſs viſible, and they are not ſtriated from the center to the circumference as the Entrochi; of theſe ſome are of the figure of a little bottle, and call'd Volvulæ Utriculatæ; and of theſe ſome have and others have not a ſtar mark'd at their bottom; others of them ſwell out in the middle, and taper a little toward each end, and are therefore call'd Dolioli or volvulæ doliatæ.

Nearly allied to the Entrochi and Volvulæ, are the Aſteriæ or Star-ſtones, well known in moſt of the Northern counties of England: theſe are of the ſame ſubſtance and inner ſtructure with the Entrochi; and as thoſe Foſſils have fragments of ſhelly bodies to which they are ſometimes fix'd, and appendages like branches, or the rudiments of ſuch growing from them, the firſt call'd Modioli, and the others branches; ſo theſe have their ſcaly bodies to which they are ſometimes affix'd, called Aſteropodia, and their appendages call'd Wires.

The *Aſteropodia*, in ſubſtance and inner texture, agree with the ſhells of the Echinitæ in our chalk pits, and with the Aſteriæ and Entrochi being form'd of an obliquely, arrang'd, tabulated Spar.

They are compos'd of ſeveral joints, and are only very imperfect fragments of the body the Aſteriæ have once been a part of; the ſeveral joints they are compos'd of are always convex on one ſide, and concave on the other, and are ſometimes rounded, ſometimes oblong, often quadrangular, and not unfrequently of different numbers of angles; they have frequently two, ſometimes more ridges running acroſs them, and ſometimes they have tubercles or ſmall protuberances on their under or upper ſide; they are ſometimes found ſingle, but more frequently are laid in ſome numbers one over another like tiles on a houſe; ſeeming to have made of part an imbricated ſhell or cruſt of ſome fiſh; they are in theſe complex pieces ever evidently fragments, and uſually of irregularly broken figures, tho' ſometimes they reſemble very much parts of the rays of one or other of the ſpecies of the Star-Fiſh; they are uſually found without the Aſteria, tho' found lying among them, but ſometimes the Aſteriæ are affix'd to and plainly grow out of them.

The Encrinos of authors is one of the bodies of this ſpecies, when in the largeſt and faireſt pieces it is ſaid perfectly to agree in figure with a ray of the Magellanick Star-Fiſh; but it is more frequently found only in ſingle joints, and theſe are called by authors the Aſteropodium minus.

Theſe are uſually of a pale blueiſh grey, or aſh-colour, ſometimes of a whitiſh and ſometimes a little reddiſh or yellowiſh, and are found with the Aſteriæ in the ſtrata of clay in Yorkſhire, and other of our Northern counties.

The Asteriæ, which ſeem a ſort of branches from theſe Aſteropodia, are ſhort, and commonly ſomewhat crooked, angular columns, compos'd of ſeveral joints, each reſembling the figure of a radiated ſtar with more or fewer points, and they are uſually found of about an inch long, and of the thickneſs of a gooſe quill; of theſe ſome have five angles or rays, and others only four; in ſome the angles are equidiſtant, and in others they are irregularly ſo; and in ſome they are ſhort and blunt, while in others they are long and narrow, and more pointed; ſome have their angles ſo very ſhort and obtuſe, that on a ſlight view they might be taken for Entrochi or Entrocho-Aſteriæ; the ſeveral joints are uſually all of the ſame thickneſs, but this is not always the caſe, in ſome they are largeſt at one end, in others at the middle; ſome have one of the rays bifid ſo as to emulate the figure of a ſix ray'd kind; they are naturally ſulcated between the angles, and ſome very little ſo; others ſo deeply, that they repreſent the rowells of a ſpur, one end of the columns is frequently found finely engraved along the edges of the angles or rays, while the other is nearly ſmooth; and the ſame is often the caſe in the ſingle joints; and not unfrequently one end of a column is indented, and the other has only five ſtriæ, running from a hollow center to the Sulci between the rays.

They are found of various bigneſſes and colours; the longeſt ſeldom arrive at two inches, and they are found to a very minute ſize, they are not unfrequently found compreſs'd and flatted, and are generally lodg'd in the ſtrata of clay, tho' ſometimes in thoſe of a laxer ſtone; they have uſually ſhells of ſea-fiſh bury'd with them, and ſometimes, as Morton obſerves, (than whom no author has treated more accurately of theſe bodies, ſo far as the bounds of his work would let him;) theſe ſhells adhere to the Aſteriæ, and when ſeparated, ſhew the marks of the Aſteria where they adher'd. This, as has been before obſerv'd of the Entrochi, is a proof the Aſteriæ were in being in the ſea, when theſe ſhells were growing to their ſize.

The *Wires* of the Aſteriæ or Apendiculæ, as ſome call them, are long ſlender bodies running out from theſe, as the branches from the Entrochi. They are compos'd of ſeveral ſhort cylindric joints with obliquely truncated ends, and each hollow'd to the middle, where there ſtands a ſmall tubercle. Theſe bodies are ſometimes two inches long, the largeſt or thickeſt joint always adheres to the Aſteriæ, and the reſt grow ſmaller, and the body taperer toward the end. In their natural ſituation on the Aſteriæ, they ſtand in regular circles at different diſtances one above another. There is always one wire in each of the Sulci or channels of the body, and theſe ſtand evenly againſt one another.

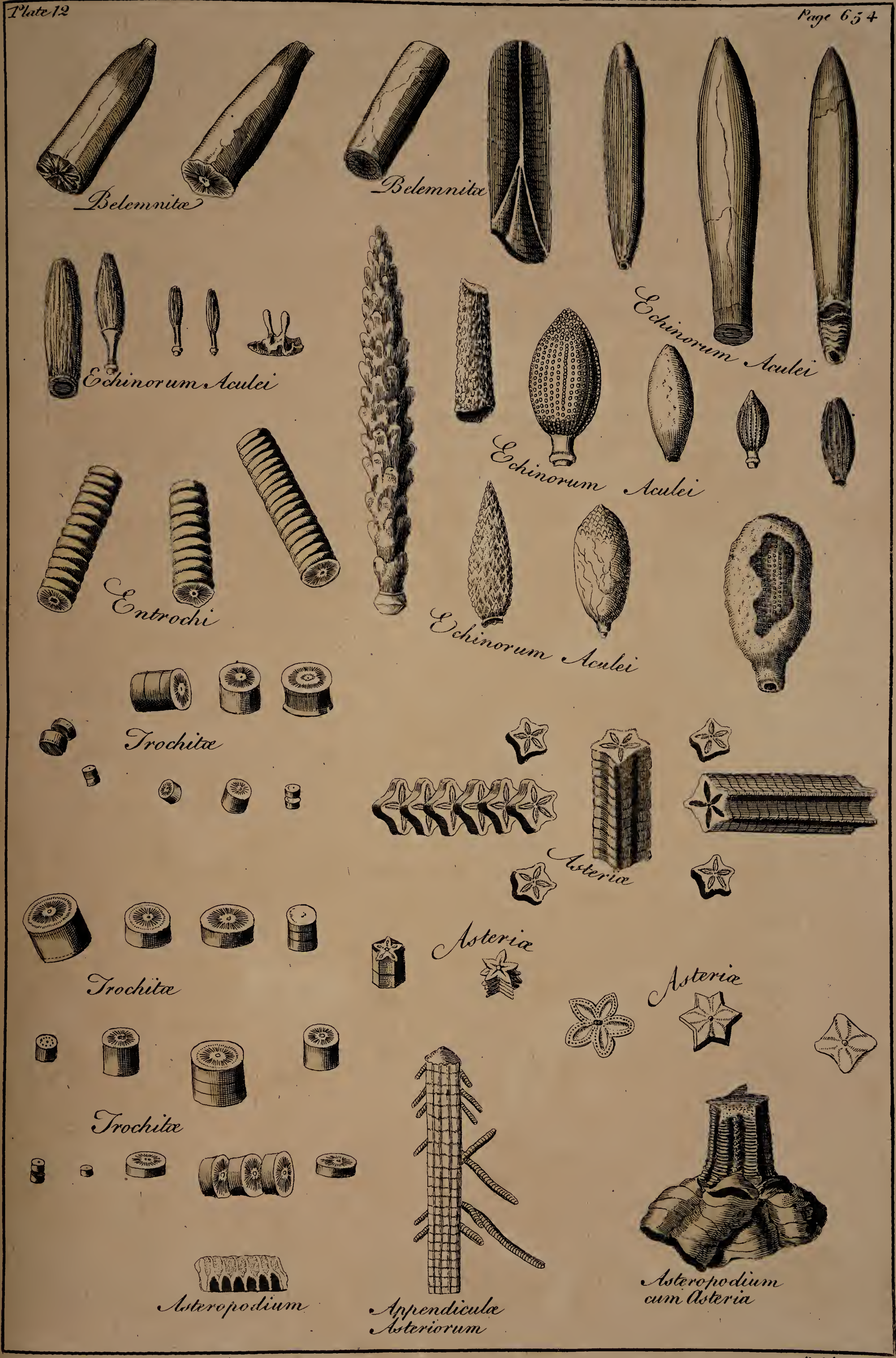
Theſe are very rarely, however, met with in this their native ſtate fix'd on the Aſteriæ; they are uſually found broken off, and the rudiments of them only are to be ſeen on the Aſteriæ; and but rarely even theſe: The bodies themſelves are more frequently found either in fragments of different lengths, or in ſingle joints, ſometimes immers'd in ſtone, and ſometimes lying looſe among the Aſteriæ in the ſtrata of clay.

FINIS.

FOSSILE BODIES, ONCE PARTS OF ANIMALS.

Plate 12

Page 654



B Cole Sculp.

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N. B. *There having been different Printers employ'd in this Volume, it has happened that the Pages from* 457, *to* 592, *are repeated a ſecond Time; the Reader is therefore deſired to obſerve, that where an Aſteriſk is added to the Number in the Index, it is meant to ſignify that the Page referred to is the ſecond of that Number.*

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